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STATE OF MONTANA
DEPARTMENT
OF
HIGHWAYS
SUPPLEMENTAL
SPECIFICATIONS
TO
STANDARD
SPECIFICATIONS
FOR
ROAD AND BRIDGE
CONSTRUCTION

1976 Edition

EFFECTIVE JULY 1, 1979

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**SUPPLEMENTAL
SPECIFICATIONS
TO
STANDARD
SPECIFICATIONS
FOR
ROAD AND BRIDGE
CONSTRUCTION**

1976 Edition

**STATE OF MONTANA
DEPARTMENT OF HIGHWAYS**

THE FOLLOWING SUPPLEMENTAL SPECIFICATIONS ARE SUPPLEMENTARY OR AMENDATORY TO THE 1976 EDITION OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION AND SHALL APPLY, INsofar AS APPLICABLE, TO ALL HIGHWAY CONSTRUCTION PROJECTS LET ON OR AFTER JULY 1, 1979.

AUGUST 1980

MONTANA SUPPLEMENTAL SPECIFICATIONS

THE FOLLOWING SUPPLEMENTAL SPECIFICATIONS ARE SUPPLEMENTARY AND/OR AMENDATORY TO THE "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION-1976 EDITION" AND WHERE NOTED, THE RED COVERED BOOKLET OF "SUPPLEMENTAL SPECIFICATIONS-EFFECTIVE JULY 1, 1979".

Page 7, (Of the Supplemental Specifications-Effective July 1, 1979).

07.08 RAILWAY-HIGHWAY PROVISIONS.

May 1, 1980

Rescind the 5th and 6th paragraphs and replace with the following:

When railway flagging or other protective service is necessary for contractor operations performed on or near railroad right-of-way, including track crossings for haul roads to Department-optioned or owned material sources, the cost of this flagging or other protective service and track crossings will be borne by the Department. The contractor shall make the necessary arrangements with the railway company for the installation of track crossings. The Department will reimburse the railway company direct for approved costs incurred for such services and costs.

The contractor shall bear the costs of all railway flagging or other protective services and installation of track crossings for haul roads for contractor-furnished material sources. When billings for such flagging or other protective service or track crossings are submitted to the Department by the railway company, the entire cost will be deducted from any monies due or that may become due the contractor.

Page 83

Article 09.04(B) (3) For any machine-power...

May 1, 1980

Rescind the second sentence in this article and replace with the following:

Rental rates shall conform to the current issue of the Rental Rate Blue Book as published by the Equipment Guide-Book Company.

Page 417

54.04(B) Prefabricated Flexible Pipe. Corrugated Metal Syphons, and the Like.

May 1, 1980

Rescind this article including the title and replace with the following:

(B) Prefabricated Metal Pipe. The pipe shall be laid on the foundation with separate sections approximately 1 inch apart to cause mesh of corrugations with outside laps of circumferential joints pointing upgrade and with the longitudinal joints on the sides. The sections shall be connected with specified types of coupling bands firmly bolted. The coupling bands shall be tapped with a mallet or other suitable tool as they are tightened.

Pipe shall be so handled in laying as to prevent bruising, scaling, or breaking of the spelter coating or other type of cover. In no case shall pipe be dropped or dragged in unloading.

Culverts used for irrigation or under other conditions where there is a continuous flow of water for extended periods will be designated on the plans as "CSP or CAP Irrigation" and as separate items from drainage, syphon, or combination irrigation and drain pipes.

Culverts used for syphons under head or pressure will be designated on the plans as "CSP or CAP Syphon" and as separate items from drainage, irrigation, or combination irrigation and drain pipes.

Field joints for each type of corrugated metal pipe shall maintain pipe alignment during construction and prevent infiltration of side fill material during the life of the installation. Circumferential and longitudinal strength shall be provided in accordance with the structural joint performance criteria of Division 2, Section 23 of the AASHTO Standard Specifications for Highway Bridges. In addition, the field joints for syphon and irrigation pipe installations shall be watertight in accordance with the requirements of Article M-170.02. All installations that fail to meet any of the above requirements shall be corrected by the contractor at no cost to the Department.

One end of steel and aluminum pipe tee sections for connection to median inlets shall be capped, if required. The cap shall be constructed of metal equivalent to the pipe and fastened to the tee section in such a manner as to be watertight and to develop a strength equivalent to the wall strength of the pipe.

Aluminum pipe shall not be directly coupled to dissimilar metals but shall be separated by a bituminous-coated coupling, polyvinyl sheeting, heavy painting with rubber-base paints, or by the use of aluminized steel.

Strutting of the pipe arches will not be required unless specified otherwise. Field joints shall be constructed using band couplers shaped to fit the formed pipe.

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Page 6

01.44 REASONABLY CLOSE CONFORMITY.

Change the last word in this article to be "Department" instead of "Government".

Page 11

02.01 PREQUALIFICATION OF BIDDERS.

Add the following as the third paragraph of the article:

It is provided, however, that a subcontractor need not be prequalified under the procedure set forth herein when the total amount of work to be performed under subcontract by that subcontractor on any one project is \$25,000 or less. Under no circumstances will the \$25,000 maximum limit be waived.

Page 12

02.03 (b) Uncompleted Work...

Change the first sentence in the second paragraph of the PREQUALIFICATION PROCEDURE FOR APPLICATION OF STATE CONTRACTOR OVERTIME LAW to read as follows:

As the contractor status on other than State, i.e., local government, construction projects is not readily available, an Affidavit of Work Progress Form will be provided in the contract documents to allow the prospective bidder, after the date of advertisement, to declare his compliance with State Law.

Page 15

02.05 EXAMINATION OF PLANS, SPECIFICATIONS, SPECIAL PROVISIONS, AND SITE OF WORK.

Place a vertical line in the right-hand margin of the first three lines of the first sentence.

Page 17

02.08 PROPOSAL GUARANTY.

Rescind this article in its entirety and replace it with the following:

02.08 PROPOSAL GUARANTY. No proposal will be considered unless accompanied by a proposal guaranty in the amount stipulated by the proposal and made unconditionally payable to the State of Montana, Department of Highways. At the bidder's option, the guaranty may be cash, cashier's check, certified check, bank money order, or bank draft. In any case it shall be drawn and issued by a national banking association located in the State of Montana or by any banking corporation incorporated under the laws of the State of Montana, or it may be a bid bond or bonds executed by a surety corporation authorized to do business in the State of Montana.

Page 21

03.03 CANCELLATION OF AWARD.

Place a vertical line in the right-hand margin of the last two lines.

03.05 REQUIREMENT OF CONTRACT BOND.

Place a vertical line in the left-hand margin on page 22 sufficient to span the first three lines.

Page 22

03.06 EXECUTION AND APPROVAL OF CONTRACT.

Place a vertical line in the left-hand margin sufficient to span the last four lines of the article.

03.07 FAILURE TO EXECUTE CONTRACT.

Rescind this article in its entirety and replace it with the following:

03.07 FAILURE TO EXECUTE CONTRACT. Failure to execute the contract within 10 days after receipt of the contract documents or within such further time as the Commission may allow shall be cause for cancellation of the award and forfeiture of the proposal guaranty, which shall become the property of the State, not as a penalty but in liquidation of damages sustained. Award may then be made to the next lowest responsible and qualified bidder, or the work may be readvertised and constructed under contract or otherwise, as the Commission may decide.

Page 28

04.04 (C)(4) Maintenance Of Traffic Control Devices During Seasonal Suspension Of Work.

Extend the vertical line in the left-hand margin to include the title of this article.

Page 33

05.01 AUTHORITY OF THE ENGINEER.

Rescind the second paragraph and replace it with the following:

The engineer will have the authority to suspend the work wholly or in part due to the failure of the contractor to correct unsafe conditions; for failure to carry out provisions of the contract; for failure to carry out orders; for unsuitable weather; for conditions considered unsuitable for the prosecution of work; or for any other reason deemed to be in the public interest.

Page 38

05.11 INSPECTION OF WORK.

Rescind the first paragraph and replace with the following:

05.11 INSPECTION OF WORK. All materials and each part or detail of the work shall be subject to inspection by the engineer. The engineer shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the contractor as required to make a complete and detailed inspection. The contractor shall make adequate provisions satisfactory to the engineer for the safety of inspectors.

06.02 (A) General:

Rescind this article in its entirety and replace with the following:

(A) General. Local materials refer to and include aggregate materials used in the surfacing structure as well as earth and rock materials used as borrow for roadway or other embankments.

Sources of local material include prospected sources, contractor-furnished sources, and mandatory sources.

When prospected sources or mandatory sources are not shown on the plans or described in the special provisions, the contractor shall provide sources where local materials can be obtained. Contractor-furnished sources shall not be used as material sources without approval of the engineer.

A bidder shall not acquire any privately owned area for his exclusive use as a materials source; however, sources owned by a bidder under a recorded, long-standing title will be permitted.

06.02 (B) Indicated Sources.

Rescind the title and the first two paragraphs of this article and replace with the following:

(B) Prospected Sources. Possible sources of local material that have been prospected by the Department may be shown on the plans and described in the special provisions. When prospected sources for surfacing materials are shown on the plans, a "Surfacing Materials Prospect Report" for each prospected source will be included in the plans.

The State of Montana, Department of Highways, disclaims any responsibility for the quantity or quality of materials from all prospected sources covered by such reports. Test data included in the reports are based upon accepted standard tests as are generally used and recognized by testing laboratories and are based solely on the samples tested from the exact locations shown. No interpretation is made or intended by the Department. Any interpretation must be the sole judgement of the person examining said tests. Any person, individual, or corporation using these tests shall hold harmless the State of Montana, Department of Highways, from all damage resulting from said interpretation.

The quality of material in such deposits will be acceptable in general, but the contractor shall determine for himself the amount of equipment and work required to produce a material meeting the specifications. It shall be understood that it is not feasible to ascertain from samples the limits for an entire deposit and that variations shall be considered as usual and are to be expected. The engineer may order procurement of material from any portion of a deposit and may reject portions of the deposit as unacceptable.

Whenever the "Surfacing Materials Prospect Report" shows a prospected source to be "Department-Optioned", the material from such source will be available for that project to the contractor at no cost or royalty, unless specifically stated otherwise in the special provisions.

Add the following as the last sentence of the fourth paragraph:

Payment to complete the agreement stipulations will be subsidiary to other contract items, unless otherwise stipulated on the plans.

Rescind the fifth paragraph and replace with the following:

An approved reclamation plan meeting the requirements of Article 06.02 (E) will be required prior to utilization of any prospected source as a materials source.

Rescind the last sentence of the article.

Page 42

06.02 (C) Contractor Furnished Sources.

Rescind the first paragraph and replace with the following:

(C) Contractor - Furnished Sources. If the contractor desires to use materials, with the exception of unclassified or special borrow, from other than Department-optioned prospected sources, he shall acquire the necessary rights to take materials from the sources and shall pay all costs related thereto, including any that may result from an increase in length of haul. All costs of exploring and developing such other sources shall be borne by the contractor. The use of material from other than prospected sources will not be permitted until representative samples taken by the engineer have been approved and written authority is issued for the use thereof. Unclassified or special borrow excavation shall be treated in accordance with the provisions of Article 11.02 (B).

Page 43

06.02 (E) Reclamation Requirements.

Rescind this article in its entirety and replace it with the following:

(E) Reclamation Requirements.

(1) General. All land used by the contractor as a material source shall be reclaimed by the contractor in accordance with an approved reclamation plan as hereinafter specified. The reclamation plan shall provide for a finished materials pit site that blends with the adjacent landscape.

The contractor shall comply with the requirements of the Montana Open Cut Mining Act (Title 50, Chapter 15, RCM 1947), the Hard Rock Mining Act (Title 50, Chapter 12, RCM 1947), the Montana Water Pollution Control Act (Title 69, Chapter 48, RCM 1947), the Montana Stream Bank Preservation Act (Title 26, Chapter 15, RCM 1947), the Montana Flood-plain Management Act (Title 89, Chapter 35, RCM 1947), and all other federal, state, and local statutes as shall apply.

Final responsibility for administration of the Montana Open Cut Mining Act and the Montana Hard Rock Mining Act rests with the Department of State Lands. Therefore, all reclamation plans and reclamation work are subject to review and approval by personnel of the Department of State Lands. The contractor shall comply with all directives and instructions issued by the Department of State Lands with regard to reclamation work.

Reclamation shall be accomplished as soon as possible after completion of removal operations. After final grading, all slopes shall be left in a stable condition. If topographic conditions permit, all slopes shall be left no steeper than 3:1. The excavated area should maintain the natural contour of the land and blend into the surrounding terrain. All outcropping should be removed or graded to daylight where possible.

Unless directed otherwise, prior to excavation for removal of material, all topsoil and overburden shall be stripped from the material source and conserved.

All new or widened haul, access, and service roads shall have topsoil salvaged from them before they are graded or surfaced, and all such roads shall be reclaimed by the contractor when removal operations are complete. Overburden or subsoil shall be stored separately from topsoil and shall be replaced before topsoil is replaced on areas being reclaimed. All topsoil that has been removed shall be uniformly redistributed to the entire area being reclaimed.

All retopsoiled areas shall be seeded during the first appropriate agricultural season following grading and topsoil replacement. Slopes shall be contour-seeded.

Newly seeded areas shall be fenced to protect them from grazing livestock, unless it is determined that there will be no livestock in the area. Reclaimed roads shall also be fenced to protect them from grazing livestock. Fencing shall be Type 3M unless otherwise specified in the plans or contract. Fencing used in conjunction with reclamation of Department-optioned sources will be designated Reclamation Fencing with the required type shown, e.g., "Reclamation Fencing -Type 3M".

Material sources shall not be located in a flowing stream, nor shall a material source be located on a stream floodway at a location likely to offer a new channel to the stream at time of flooding. The final floor elevations of material sources shall be sufficiently high that they are not subjected to fluctuation in the groundwater table. The contractor shall take all necessary precautions for the protection of the general public and the safety of persons and property adjacent to the work.

(2) Contractor-Furnished Sources. Before commencing operations for the removal of earth, quarried rock, sand, gravel, or other substance from a contractor-furnished material source, the contractor shall obtain approval of a reclamation plan for the material source from the State Board of Land Commissioners in compliance with the Open Cut Mining Act or the Hard Rock Mining Act. The contractor's attention is directed to Section 10(50-1510) of the Open Cut Mining Act concerning the time allowed for approval of reclamation plans.

When the amount of material to be removed from a contractor-furnished borrow source is less than 10,000 cubic yards, the reclamation plan for the source shall be submitted to the Department of Highways. The Department will, at its discretion, either approve the plan or forward it to the State Board of Land Commissioners for their approval. Reclamation plans submitted to the Department of Highways shall meet the minimum requirements set down in the following paragraphs:

(3) Department-Optioned Sources. When a reclamation plan for a Department-optioned source is furnished by the Department and the requirements thereof included in the contract documents, the contractor shall reclaim the material source in compliance with the reclamation plan included in the proposal. When a reclamation plan for a Department-optioned source is not furnished by the Department, the contractor shall submit a reclamation plan for the material source to the Department of Highways.

The reclamation plan shall provide for reclamation of the entire disturbed area, shall include all reclamation requirements contained in the proposal, and shall include the following:

(a) A Map Information Sheet (Form CB 18) furnished by the Department of Highways, completed in full by the contractor, and attached to the detailed map of the pit surrounding area.

(b) Two Maps: One showing general locations and access, and the other showing detailed information on the pit and surrounding area. The access map should show proximity to the nearest town, the exact route to the pit, and any other information necessary to obtain access to the pit.

The detailed map shall be drawn to scale and shall include the following:

1. Areas existing and intended to be mined, reclaimed, or otherwise disturbed over the life of the operation.
2. Areas to be mined during the first year.
3. Locations of existing and proposed stockpiles for topsoil, overburden, and processed materials.
4. Location of surface water on or near the site, including all standing water and all flowing water with direction of flow indicated.
5. Locations of existing and proposed haul, access, and support roads and equipment parking and maintenance areas; proposed reclamation or other handling of these areas when removal operations are complete.
6. Locations of existing and proposed treatment, screening, washing, crushing, and sorting plants and other processing facilities.
7. Locations of existing and proposed settling ponds, including direction of water flow and indicating whether recirculating or draining to a natural drainage course.
8. Locations and cross sections of any proposed dams and diversion structures.
9. Locations of permanent structures such as buildings, power lines, fences, wells, irrigation facilities, and buried utility lines.
10. Locations of natural features such as cliffs and outcrops and such natural drainage features as natural slopes, gullies and creeks, indicating direction of flow.
11. Location of area where waste will be disposed of or buried.
12. Land ownership boundaries of the site with names of property owners and legal description down to 1/4 section. Section corners shall be shown, and adjacent property shall be labeled by usage, such as pasture, residential, forest, or other.
13. A sketch showing topographic features, anticipated slopes, grading depths, drainage, and other data necessary to indicate the intended material removal and the intended appearance of the finished pit; or a contour grading plan showing the intended finished shape of the area.
14. Location of fencing to protect newly seeded areas from grazing livestock, unless it is determined that there will be no livestock in this area.

(4) Method of Measurement. Reclamation of contractor-furnished sources will not be measured for payment but will be considered incidental to and absorbed in other items of the contract.

For the reclamation of Department-optioned sources: Topsoil will be measured as specified in Article 11.07(E). Seeding and fertilizing will be measured as specified in Article 17.14. Reclamation fencing will be measured as specified in Article 81.06(A). Panels, gates, deadmen, and dozer hours will not be measured for payment but will be considered incidental to and absorbed in other contract items.

(5) Basis of Payment. Reclamation of contractor-furnished sources will not be paid for directly but will be considered incidental to and absorbed in payment for other contract items.

For reclamation of Department-optional sources: Topsoil, seeding, fertilizing, and reclamation fencing will be paid for at the contract unit prices for these items.

Page 51

07.01 LAWS TO BE OBSERVED.

Rescind the fourth and fifth paragraphs and replace with the following:

In the performance of the contract, the contractor shall comply with all laws, rules, regulations, and ordinances governing safety, health, pollution, sanitation, and disposal of waste materials, and he shall make available such additional safeguards, safety devices, and protective equipment as are reasonably necessary to protect life and health. Violation of properly promulgated laws, rules, regulations, and ordinances reported by responsible agencies may result in the issuance of an order to suspend work until such time as the violation is corrected.

Page 53

07.08 RAILWAY-HIGHWAY PROVISIONS.

Rescind this article in its entirety and replace it with the following:

07.08 RAILWAY-HIGHWAY PROVISIONS. All work performed by the contractor or his subcontractor on railroad right-of-way shall be performed at such times and in such a manner that it does not interfere unnecessarily with the movements of trains or traffic upon the property of the railroad company.

The contractor shall give sufficient advance notice, as determined by agreement between the contractor and railway officials, before starting operations on railway property, hauling across railway tracks, or blasting within 1000 feet of railway property.

The contractor is cautioned to observe the requirements of Articles 07.10 and 07.18 when blasting or performing other work on or near railway property. The Department will enter into a three-party agreement with the contractor and railway officials, when required by the railway company.

Railway companies shall have the right to furnish all flagging or other protective service as, in their judgement, is necessary for the safe operation of trains or traffic upon their tracks.

When railway flagging or other protective service is necessary for contractor operations required by the plans or special provisions, the cost of this flagging or other protective service will be borne by the Department. The Department will reimburse the railway company direct for approved costs incurred for such services.

When railway flagging or other protective service is necessary for contractor operations not required by the plans or special provisions, the entire cost of this service will be borne by the contractor at no cost to the Department. When billings for such flagging or other protective service are submitted to the Department by a railway company, the entire cost of this service will be deducted from any monies due or which may become due the contractor.

If the plans or special provisions provide specified railway crossings, the Department will make arrangements with the railway company for the specified new

crossings. If the contractor elects to haul over crossings other than those shown on the plans or special provisions or if the plans or special provisions do not provide specified crossings, then the contractor or his subcontractor shall make arrangements with the railway company for necessary new crossings and shall not legally obligate the Department or its agents.

Temporary crossings requested by the contractor shall be constructed, protected, maintained, and removed by the railway company, and the entire cost shall be borne by the contractor based on billings submitted by the railway company. The contractor shall not cross the railway right-of-way or tracks except at temporary crossings or existing, open public grade crossings. The contractor shall furnish insurance for operations performed by him or by subcontractors or both as set forth in Article 07.15 or by the special provisions.

Page 60

07.15 INSURANCE REQUIREMENTS.

Change the title of this article to be "INSURANCE REQUIREMENTS AND DAMAGE LIABILITY" and make the following additional changes:

Add the following paragraph to (D) General:

Each insurance policy covering contractor's public liability and property damage liability insurance shall carry an endorsement covering the "Save Harmless Clause" as set forth in Article 07.01 and in Article 07.15 (F).

Add the following:

(F) Responsibility for Damage Claims. The contractor shall indemnify and save harmless the Department, its officers, and employees from all suits, actions, or claims of any character brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of the said contractor or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in constructing the work; or because of any act or omission, neglect, or misconduct of said contractor; or because of any claims or amounts recovered from any infringements of patent, trademark, or copyright; or from any claims or amounts arising or recovered under the "Workmen's Compensation Act," or any other law, ordinance, order, or decree; and so much of the money due the said contractor under and by virtue of his contract as may be considered necessary by the Department for such purpose may be retained for use of the State; or, in case no money is due, his surety may be held until such suit or suits, action or actions, claim or claims for injuries or damages as aforesaid shall have been settled and suitable evidence to that effect furnished to the Department; except that money due the contractor will not be withheld when the contractor produces satisfactory evidence that he is adequately protected by public liability and property damage insurance.

Page 64

Insert new article as follows:

07.22 PROTECTION OF ARCHEOLOGICAL AND HISTORICAL FINDINGS. When any contractor's operation encounters remains of prehistoric people's dwelling sites or artifacts of historical or archeological significance, the operation shall be temporarily

discontinued until notified by the engineer to resume work. The engineer will contact archeological authorities to determine the disposition thereof. When directed by the engineer, the contractor shall excavate the site in such a manner as to preserve the artifacts encountered and shall remove them for delivery to the custody of the proper State authorities. Such excavation will be considered and paid for as extra work.

Page 71

08.06 (C) Extensions.

Rescind the fourth paragraph and replace it with the following:

No additional contract time will be allowed for increases in percentages of asphalt in plant mix materials, for the addition of anti-stripping additives to bituminous materials, and for the addition of or for increases in hydrated lime and mineral fillers to plant mix materials.

Page 79

09.025 (A) General.

Rescind the second paragraph in this article and replace it with the following:

If the freight rates are increased between the date of bid opening and the date on which the designated materials are shipped to the project and if the increased freight rates cause an additional cost to the contractor, the Department will reimburse the contractor in the exact amount of cost caused by such increase, provided the contractor claims reimbursement and the claim is supported by proper certification originating with the transporter.

In the last line of the fifth complete paragraph on Page 80, change the present work "care" to "car".

Rescind the eighth paragraph in this article and replace it with the following:

Compensation will be limited to the net increase or decrease in freight rates for materials transported by rail or truck carriers. Compensation will further be limited to the exact amount of such increase or decrease as established by rate schedules fixed by the Department of Public Service Regulation or the United States Interstate Commerce Commission for the hauling units used.

Page 82

09.04 (B) Force Account Basis.

Rescind the first paragraph on Page 84 and replace it with the following:

When extra work on a force account basis is performed by a subcontractor in accordance with the provisions of an extra work order, a percentage based on the following table will be allowed to reimburse the prime contractor for the administrative expenses incurred in connection with the work. This administrative allowance is applicable to charges for labor and materials only and will be applied to all charges and added percentages specified in paragraphs (1), (2), & (4) above. Bid items in the original contract are not eligible for this administrative allowance.

09.05 ELIMINATED ITEMS.

Add the following as the last sentence in this article:

In no case of this sort will any allowance be made for anticipated profits.

09.06 PARTIAL PAYMENTS.

Delete the first sentence in this article in its entirety.

09.09 PAYMENT FOR EXCESS CRUSHED COVER AGGREGATE.

The schedule preceding the last paragraph in the article shall be revised to read as follows:

GRADE	1	2	3	4
Cover Material	\$3.50	\$4.25	\$4.50	\$5.00
Stone Chips	\$4.75	\$5.00	\$5.50	-----

09.10 PAYMENT FOR HAUL FOR EXCESS CRUSHED MATERIAL.

In the third line, insert the word "mile" after the word "ton" so that the line will read as follows: "...will be allowed at the rate of \$0.15 per ton mile for haul distance in excess...".

09.20 MOBILIZATION.

Rescind subparagraphs (B) (1) through (B) (5) of this article and replace with the following:

(1) When 5% of the original contract amount is paid for other contract items and for contractor-produced material in storage, 25% of the amount bid for mobilization or 3% of the original contract amount, whichever is lesser, will be paid.

(2) When 10% of the original contract amount is paid for other contract items and for contractor-produced material in storage, 50% of the amount bid for mobilization or 6% of the original contract amount, whichever is lesser, will be paid.

(3) When 25% of the original contract amount is paid for other contract items and for contractor-produced material in storage, 60% of the amount bid for mobilization or 8% of the original contract amount, whichever is lesser, will be paid.

(4) When 65% of the original contract amount is paid for other contract items and for contractor-produced material in storage, 90% of the amount bid for mobilization or 10% of the original contract amount, whichever is lesser, will be paid.

(5) When 80% of the original contract amount is paid for other contract items and for contractor-produced material in storage, 100% of the amount bid for mobilization will be paid.

09.20 (C) Upon Completion of...

Rescind the first paragraph of this article.

Page 103

11.01 DESCRIPTION.

Rescind this entire article and replace it with the following:

11.01 DESCRIPTION. This work shall consist of excavation and grading the roadway, streets, borrow areas, ditches, channels, gutters, furrows, parking areas, intersections and approaches, slope rounding, benches on backslopes and benches under sidehill fills, removal and disposal of slides, removal and disposal of unsuitable material from the roadbed and beneath embankment areas, the construction and removal of detours and connections shown on the plans or directed by the engineer, excavating selected material found in the roadway that is ordered for specific use in the improvement, serration of cut slopes, and removal and disposal of surplus material. All excavating and grading work shall be in accordance with the specifications and in reasonably close conformity with the lines, grades, and cross sections shown on the plans or established by the engineer.

11.02 (A) Unclassified Excavation.

Rescind this entire article and replace it with the following:

(A) Unclassified Excavation. Unclassified excavation shall consist of the excavation and specified disposal of any and all material described in Article 11.01, regardless of type or nature, and obtained in areas within the right-of-way or construction easement areas as designated on the plans or staked by the engineer.

If the contract contains no reference to other types of excavation as defined in this section, then unclassified excavation shall include all removal and disposal described in Article 11.01; but it shall not include borrow excavation nor subcut excavation as defined in Articles 11.02 (B) and 11.02 (E).

11.02 (B) (1) Unclassified Borrow.

Rescind the first and second sentences and replace with the following:

(1) Unclassified Borrow. Unclassified borrow required for the construction of embankments or for the other portions of the work shall consist of obtaining approved excavation material from outside the right-of-way or construction easement areas. Material from a Department-optioned or Department-owned borrow area will be available to the contractor at no cost. The contractor may obtain material from other borrow sources, providing the location of each source is approved and the quality of material is equal to or better than the material from the sources furnished by the Department.

Page 105

11.03 CONSTRUCTION METHODS (EXCAVATION).

Renumber Articles 11.03(B) (2) (c) thru 11.03 (B) (2) (i) Maintenance of Constructed Roadway to be Articles 11.03 (C), 11.03 (D), 11.03 (E), 11.03 (F), 11.03 (G), 11.03 (H), 11.03 (I), and 11.03 (J).

Rescind Article 11.03 (B)(2)(k).

11.04 (B) Embankment at Structures.

Rescind the last sentence in the second paragraph and add the following as the third paragraph of this article.

Fill adjacent to end bents of bridges may be completed up to the bottoms of backwalls before the superstructure is in place. Fill shall not be placed against backwalls or abutments before the superstructure is in place. The height of fill against backwalls and abutments shall be kept approximately equal at both ends of structures.

11.04 (C)(1) Preparation of Embankment Foundations.

Change the second sentence in the last paragraph on Page 113 to read as follows:

The width of the above treatment shall be that of the subgrade (as defined in Article 01.61).

TABLE I - Measurement of Roadway Rolling.

Change Note (d) at the bottom of Table I to read as follows:

(d) See Table II for methods of computation for measurement & payment.

TABLE II - Measurement of Roadway Rolling.

Change the second sentence in Note 2 to read "See Table I".

In Note 4, Note 5, and Note 9 (d), change the words "Drawing 13-02" to be "Table II".

16.43 METHOD OF MEASUREMENT.

Change the last line of this article to read as follows:

"...11.07, obliterated as required".

17.12 (A) Grass seed.

Change the second sentence of the sixth paragraph to read as follows:

The germination test shall have been made within a period of 12 months before the seeding date.

17.13 (A) General.

Add the following after the third paragraph:

The gravel area extending from the edge of pavement to the subgrade shoulder shall not be seeded, fertilized, or mulched.

17.13 (B) Conditioning Seedbed Surface.

In the third line of this article, eliminate "... and (L)".

Page 171

20.03 (F) Scales.

Under Paragraph (2) (b) on page 172, change the second word in the second sentence to be "calibration" instead of "chain". The sentence should read: "A calibration test will be required...".

Rescind Paragraph (2) (c) in its entirety and replace it with the following:

(c) Calibration computations, calibration procedures and results, and related documents shall be available for review by the engineer. If a test chain is used, it shall be clearly marked with its calibration constant. The test chain or test weights shall be carried in a suitable container and shall be immediately available for testing of the belt conveyor scales.

Rescind the last paragraph on Page 172 in its entirety.

Page 176

20.06 SURFACE SMOOTHNESS.

Rescind the first sentence in the second paragraph of this article.

20.07 (B) Haul on Binder will be measured...

Rescind this article in its entirety and replace it with the following:

(B) When specified as a contract item, haul on binder will be measured in accordance with Article 12.22. When not specified as a contract item, haul on binder will be considered incidental and necessary to the performance of the binder item of the contract.

Page 177

20.08 (A) Binder will be paid for...

In the third line of this article ahead of the word "labor", add the word "haul", so this line reads:

"...for all material, haul, labor, equipment, tools, and...".

20.08 (B) Haul on binder will be paid for...

Rescind this article in its entirety and replace it with the following:

(B) When specified as a contract item, haul on binder will be paid for at the contract unit price, which price and payment will be full compensation for the work. When not specified as a contract item, haul on binder will not be paid for directly but will be considered incidental to and absorbed in the payment for binder.

Page 184

22.04 (E) Compaction.

Change the last paragraph in this article to read as follows:

If the section is reconstructed after 3 hours from the time mixing is complete, 100 percent of the original cement content shall be added to the mixture, unless the engineer determines this amount is not required.

Page 186

22.05 (A) All placing,...

Rescind the second paragraph of this article and replace it with the following:

If the uncompacted cement mixture is wetted by rain so that the average moisture content during compaction exceeds the optimum moisture content by more than 2 percent, the entire section shall be reconstructed in accordance with these specifications. If reconstructed after 3 hours from the time mixing is complete, 100 percent of the original cement content shall be added to the mixture, unless the engineer determines this amount is not required. The contractor shall receive no additional compensation for such reconstruction or for any additional cement required.

Page 193

26.04 CONSTRUCTION METHODS.

Rescind this article in its entirety and replace it with the following:

26.04 CONSTRUCTION METHODS. Stockpile sites shall be cleared of weeds, roots, stumps, rocks, and other contaminating matter. The cleared matter shall be disposed of or leveled as directed. Sites shall occupy a minimum area. The stockpile floor shall be firm, smooth, and well-drained, shall be of reasonably uniform cross section, and shall adequately support the stockpile. A bed of aggregate suitable to prevent the inclusion of soil or foreign material shall be maintained.

The area around stockpiles completed under maintenance contracts shall be made neat in appearance. Spilled aggregate shall be neatly removed and disposed of as directed.

Stockpiles shall be constructed of at least three layers. Each completed layer shall be approximately 4 feet in height and shall be completed before the next layer is started. No material shall be allowed to "cone" down over the next lower tier. Completed stockpiles shall have uniform top and side slopes and shall present a neat appearance. Intermingling of aggregates from adjacent stockpiles containing different gradations shall be prevented.

When material is stockpiled by conveyor, the material shall not be allowed to drop more than 12 feet. The material shall be deposited in a succession of merging cone piles. Coned piles shall not exceed 12 feet in height and shall be leveled to a thickness of approximately 4 feet to form a completed layer.

When material is stockpiled by trucks, the stockpile width shall be greater than the width of a single dump truck. Dumping over the sides of the stockpile is not permitted.

Equipment or methods that cause segregation, degradation, or contamination of the aggregate shall not be used to construct stockpiles or to deliver stockpiled materials.

Excessive degradation will be determined by sieve tests of samples taken from any portion of the stockpile over which equipment has operated. Failure of such samples to meet all grading requirements for the aggregate shall be considered cause for discontinuance of such stockpiling procedures.

Stockpiles with excessive segregation shall be remixed and restockpiled. When stockpiling methods or equipment cause stockpiled material to be out of specifications, the material shall be brought back within specifications at no cost to the Department.

Page 195

SECTION 30 - PLANT MIX PAVEMENT.

Rescind this section in its entirety and replace with the following:

SECTION 30 PLANT MIX PAVEMENT

30.01 DESCRIPTION. These specifications include general requirements that are applicable to all grades of bituminous pavements of the plant mix type irrespective of gradation of aggregate, kind and amount of bituminous material, or pavement use. Deviations from these general requirements will be indicated in the specific requirements for each grade.

Plant mix pavement is designated as either plant mix surfacing or plant mix base.

Plant mix pavement work shall consist of one or more courses of plant mix bituminous mixture constructed in accordance with these specifications and in reasonably close conformity with the lines, grades, thickness, and cross section shown on the plans or established by the engineer.

30.02 MATERIALS.

(A) Composition of Mixtures.

(1) General. As soon as a sufficient volume of aggregate material has been produced to be representative of total production, the contractor shall establish and submit a proposed job mix aggregate gradation for each grade of plant mix pavement mixture to be produced from a source. This proposed gradation shall be within the limits shown in TABLES 1 and 2. The proposed job mix aggregate gradation shall be submitted on Form No. CB-30 and shall be subject to the engineer's approval. The contractor will be responsible for producing aggregates that will conform to the approved job mix aggregate gradation when sampled and tested for final acceptance.

After sufficient volume of aggregate material has been produced to be representative of total production, representative samples will be obtained and submitted to the Materials Bureau at least 15 days prior to mixing operations. The Materials Bureau will establish for each mixture a design mix formula consisting of the approved job mix aggregate gradation, a recommended asphalt content, and the types and quantities of additives, if needed.

The above procedure shall be repeated to the extent necessary when there is a change in the properties of aggregate within a source or there is a change to a different source.

A job mix formula for each grade of bituminous mixture will be established in the field based on the respective design mix formula. The engineer may vary the asphalt content portion of the job mix formula as necessary to fit field conditions, based on Marshall test results and visual observation of the mix. The approved job mix aggregate gradation shall remain in effect until modified by the engineer and, in general, will be modified only to improve the quality of the mix or completed pavement.

The point of acceptance for the physical properties of the aggregates, other than combined gradations, will be in the stockpiles. Samples for acceptance testing for aggregate gradations will be taken just prior to the addition of bituminous material to the mixtures. However, when aggregate gradation is controlled by a cold feed control system without plant screens in accordance with Article 30.03 (A)(12), samples for acceptance testing may be taken from the cold feed. Cold feeds to batch plants will not be sampled for acceptance testing when plant screens are utilized.

(2) Plant Mix Surfacing. The bituminous plant mix surfacing shall be composed of a mixture of aggregate, filler if required, and bituminous material. The gradation of the aggregate shall be specified in the contract or plans as Grade A, Grade B, Grade C, or Grade D. The several aggregate fractions shall be sized, uniformly graded, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula.

The maximum permissible variations from the job mix formula shall be as shown in TABLE 1 for each grade of plant mix surfacing. The permissible variations from the job mix formula shall not permit the use of any mix that would be outside the specification limits, through the application of the variation.

(3) Plant Mix Base. The bituminous plant mix base shall be composed of a mixture of aggregate, filler if required, and bituminous material. The gradation of the aggregate shall be specified in the contract or plans as Grade I or Grade II.

(B) Aggregate.

(1) Plant Mix Surfacing.

(a) The aggregate shall meet the requirements of Article 20.02 (A).

(b) The aggregate material shall have a wear factor not to exceed 50 percent at 500 revolutions, as determined by MT-209.

(c) Material retained on the No. 4 sieve shall be classed as coarse aggregate, and material passing the No. 4 sieve shall be classed as fine aggregate.

(d) Not less than 50 percent by weight of the coarse aggregate particles shall have at least one fractured face, as determined by MT-217.

(e) The liquid limit for that portion of the fine aggregate passing a No. 40 sieve shall not exceed 25, nor shall the plasticity index exceed six, as determined by MT-208.

(f) The final produced aggregate, including treated aggregate, shall not have a swell of more than 10 percent in 8 days and shall show no cracking or disintegration when tested for volume, as determined by MT-305.

(g) The aggregate shall be free from adherent films of clay or other matter that will prevent thorough coating of the rock with bituminous material, as determined by MT-213.

(h) The aggregate for Grade A, Grade B, Grade C, and Grade D Plant Mix Bituminous Surfacing, including mineral filler when required, shall meet the requirements of TABLE 1 below.

TABLE 1 - AGGREGATE FOR PLANT MIX SURFACING

Percentage by Weight Passing Square-Mesh Sieves - Montana Test Method MT-202

SIEVE SIZE	PERCENT PASSING				JOB-MIX VARIATIONS
	Grade A	Grade B	Grade C	Grade D	
1"	100				
3/4"	90-98	100	100		
5/8"				100	Plus or Minus 7.0%
1/2"	75-90	80-100			Plus or Minus 7.0%
3/8"	60-80	70-90		75-100	Plus or Minus 7.0%
No. 4	40-55	45-65	45-70	50-72	Plus or Minus 7.0%
No. 10	30-40	32-45	25-55	35-50	Plus or Minus 4.0%
No. 40	15-28	15-25		16-28	Plus or Minus 4.0%
No. 200	3-8	4-10	2-10	5-11	Plus or Minus 2.0%

(2) Plant Mix Base.

(a) The aggregate shall meet the applicable requirements of Article 20.02 (A).

(b) The aggregate material shall have a wear factor not to exceed 50 percent at 500 revolutions, as determined by MT-209.

(c) The aggregate material shall not have a swell of more than 15 percent in 8 days and shall show no cracking or disintegration when tested for volume swell, as determined by MT-305.

(d) The liquid limit for that portion of the fine aggregate passing a No. 40 sieve shall not exceed 25, nor shall the plasticity index exceed six, as determined by MT-208.

(e) Dust Ratio. The portion passing the No. 200 sieve shall not be greater than two-thirds of the portion passing the No. 40 sieve.

(f) The aggregate shall be free from adherent films of clay or other matter that will prevent thorough coating of the rock with bituminous material, as determined by MT-213.

(g) Aggregate for plant mix bituminous base, including mineral filler when required, shall meet the gradation requirements of TABLE 2 below.

TABLE 2 - AGGREGATE FOR PLANT MIX BASE COURSE

Percentage by Weight Passing Square-Mesh Sieves Montana Test Method MT-202		
SIEVE SIZE	PERCENT PASSING	
	Grade I	Grade II
1½"	100	-
1"	90-100	100
No. 4	35-65	35-65
No. 200	3-10	3-10

(C) Bituminous Material. The bituminous material shall be the type and grade specified and shall meet the requirements of Section M-120. The percentage

of bitumen in the mix, expressed as a percentage by weight of total dry aggregate, will be determined by the job mix formula and may be adjusted by the engineer. The quantity of bituminous material shall not vary from the established percentage by more than plus or minus 0.5 percent.

(D) Blending Material. Blending material shall consist of selected, natural mineral aggregate to be combined with other produced aggregate to bring the combined final product into specification limits.

(E) Mineral Filler. Mineral filler shall meet the requirements of Article M-340.07. The proposed quantity is not guaranteed to be used or required. The State reserves the right to increase or omit all or any part of the mineral filler item, and no compensation will be allowed by reason thereof. The actual quantity and kind of mineral filler to be used shall be based on tests made with the various kinds of mineral filler on crushed aggregates produced for use in plant mix.

(F) Additives.

(1) Hydrated Lime. Hydrated lime shall meet the requirements of Article M-340.02.

When hydrated lime is introduced into a paving mixture, it shall be considered as a chemical additive and shall not be included in the test results for the percentage of material passing all sieves.

(2) Anti-Stripping Additive. When the Materials Bureau tests so indicate, it shall be a requirement that a laboratory-approved, heat-stable, anti-stripping additive be blended into the bituminous material prior to application. The percentage of additive will be determined by laboratory tests on samples of the actual aggregate that the contractor proposes to use for construction of the project. The anti-stripping additive shall be combined with the bituminous material at the refinery in such a manner that it will be uniformly distributed throughout the bituminous material.

The proposed quantity is not guaranteed to be used or required. The State reserves the right to increase or omit all or any part of the anti-stripping additive item, and no compensation will be allowed by reason thereof.

30.03 EQUIPMENT.

(A) Requirements For All Mixing Plants. Plants used for preparation of bituminous mixtures shall meet all the requirements for all mixing plants except that scale requirements shall apply only where proportioning by weight is used, and cold feed control requirements shall apply only where aggregate gradation is controlled by a cold feed control system.

(1) General. Mixing plants shall be either the weight-batching type, the continuous-flow mixing type, or dryer drum type.

Mixing plants that are not capable of continuously producing a mixture meeting requirements specified will not be allowed.

(2) Storage and Heating Equipment. Tanks for storage of bitumen shall be capable of heating the bitumen, under effective and positive control at all times, to temperature requirements specified. The heating system shall provide uniform heating of the entire contents of tanks.

The circulating system for bitumen shall have its own pump or pumps and shall have no inlet or outlet pipe or drain into which fuel oil or other foreign material can be introduced.

Storage tanks shall have a positive means of measuring the quantity of their contents by gauge, calibrated rod, or float.

(3) Feeder for Dryer. Plants shall be provided with accurate, mechanical means for uniformly feeding the mineral aggregate into the dryer.

(4) Bins. Bins and access to the sampling area of bins shall be so constructed that representative samples can be readily and safely obtained. Separate, dry storage shall be provided for mineral filler, when used.

(5) Bituminous Control Unit. Satisfactory means of weighing or metering shall be provided to obtain the proper quantity of bitumen in the mix within the limits specified. Suitable means shall be provided for checking the quantity or rate of flow of bituminous material into the mixer.

(6) Thermometric Equipment. Thermometric equipment shall have an adequate range in temperature reading, shall be accurate to plus or minus 5 degrees F, and shall be sensitive to a rate of temperature change of not less than 10 degrees per minute.

An armored thermometer or other approved thermometric equipment shall be fixed in the bitumen feed line at a suitable location near the charging valve at the mixer.

(7) Emission Control. Scrubbers or similar devices shall be used as required by the Department of Health and Environmental Sciences. Liquids from a wet scrubber shall not be discharged into a live stream, lake, or pond. The effluent shall be circulated through sludge pits or tanks. The resultant sedimentation, together with all other waste material developed by crushing and mixing operations, shall be contained or otherwise acceptably disposed of in connection with the reclamation work prescribed in Article 06.02 (E).

(8) Scales for Hauling Units. Scales for hauling units shall meet the requirements of Article 20.03 (F).

(9) Plant Scales. All weighing equipment is subject to approval by the engineer and shall be capable of easy adjustment of any working part.

Scales shall be accurate to within 0.5 percent of the maximum load that may be required.

The contractor shall have on hand not less than ten 50-pound weights for testing scales. Scales shall be inspected and sealed as often as the engineer deems necessary to assure continued accuracy.

Scales for any weigh box or hopper, including scales used for weighing materials discharged from a surge or storage bin, may be either the beam or springless dial type and shall be of a standard make and design. However, these specifications shall not preclude the use of other types of weighing devices, such as load cells or weigh bar type devices, provided they are capable of maintaining the accuracy required by these specifications and can be tested for accuracy using 50-pound weights.

Scales of the beam type shall have a separate beam with a telltale indicator for each size aggregate and a tare beam for balancing the hopper. The telltale indicator shall start to function when the load being applied is within 100 pounds of the load desired. Poises shall be designed to lock in any position and to prevent unauthorized change of position.

Dial scales shall be springless, of standard make, designed, constructed, and installed so that they will be maintained free from vibration. They shall be of such size that the numerals on the dial may be read at a distance of at least 10 feet. The dial shall be of the compounding type with full complements of index points. Pointers that give excessive parallax errors shall not be used. The scales shall be substantially constructed and, if not capable of maintaining positive adjustment, shall be replaced when so ordered. All dials shall be so located that they are plainly visible to the operator at all times.

(10) Automatic Printer System. The contractor may provide an approved automatic printer system, in lieu of plant and truck scales. An automatic printer system shall print the weights of materials delivered, and such weights shall be evidenced by a weigh ticket for each load.

The recorded weight shall be accurate to within 0.5 percent of the true weight. The engineer may require random loads to be checked on sealed scales at no cost to the Department.

(11) Safety Requirements. Adequate and safe stairways to the mixer platform and sampling points shall be provided, and guarded ladders to other plant units shall be placed at all points where accessibility to plant operations is required. Accessibility to the tops of truck bodies shall be provided by a platform or other suitable device to enable the engineer to obtain samples and mixture temperature data.

All gears, pulleys, chains, sprockets, and other dangerous moving parts shall be thoroughly guarded and protected. Ample, unobstructed space shall be provided on the mixing platform. A clear and unobstructed passage shall be maintained at all times in and around the truck loading area. This area shall be kept free from material falling from above.

(12) Cold Feed Control. At the contractor's option, aggregate gradation may be controlled by a cold feed control system permitting hot mix plant operation without plant screens, with the exception of a scalping screen. Each individual aggregate shall be fed through a separate feeder that has a positive feed that can be easily and accurately calibrated. The feed shall be quick-adjusting and shall maintain a constant, uniform flow throughout the range of its calibration.

The aggregate shall be recombined in the cold feed process in the proper proportions before being fed into the dryer.

Permission to continue under the cold feed control option may be rescinded upon failure to maintain production within gradation limits.

(B) Batching Plant.

(1) Dryer. Plants shall include a dryer or dryers that continuously agitate the aggregate during the heating and drying process. The dryer shall be equipped with a mercury-actuated thermometer, an electric pyrometer, or other approved thermometric instrument with a dial scale. The thermometric instrument shall be placed at the discharge chute of the dryer and shall indicate or register automatically the temperature of the heated aggregate.

After drying, all transfer or conveyance of material from the dryer to the mixer shall be completely enclosed.

(2) Screens. Plant screens, if used, shall be capable of screening all aggregate to the specified sizes and proportions and have normal capacity in excess of the full capacity of the mixing unit.

(3) Bituminous Control. The equipment used to measure the bituminous material shall be accurate to within plus or minus 0.5 percent of the true measure.

The plant shall have an adequately heated, quick-acting, non-drip charging valve located directly over the bituminous material bucket. The bucket shall be so arranged that it will deliver the heated bitumen in a thin, uniform sheet or in multiple streams to the full width of the mixing unit.

(4) Mixing Unit. The mixing unit shall be an approved type capable of producing a uniform mixture within the job-mix variation. The mixer box, if not enclosed, shall be equipped with a dust hood that prevents loss of dust.

The mixer box shall be equipped with a lock timing device that accurately controls the mixing cycle.

(5) Aggregate Sampling Device. An approved sampling device that is capable of providing a representative sample of dried aggregate shall be provided when the plant is operated utilizing plant screens. When cold feed controls are used, an approved sampling device capable of providing a representative composite sample shall be provided at a point just prior to the aggregate entering the dryer.

(C) Continuous Mixing Plant.

(1) Aggregate Control. A cutoff system shall be used that automatically stops mixing operations when the minimum level in the bin has been reached. Each bin shall have an overflow spout to control the top level of the aggregate in the bin.

The plant shall include means for calibration of gate openings by weighing test samples. Provisions shall be made so that material fed out of individual orifices may be bypassed to individual test boxes. The contractor shall provide a platform scale of approximately 500-pounds capacity and containers of adequate size for weighing test samples drawn from the gates.

(2) Dryer. The requirements of Article 30.03 (B)(1) also apply to continuous mixing plants.

(3) Screens. The requirements of Article 30.03 (B)(2) also apply to continuous mixing plants.

(4) Bituminous Control. The volumetric proportioning device for the bitumen shall be a rotating, positive-displacement, bitumen-metering pump with a satisfactory nozzle arrangement at the mixing unit. The operating speed of the pump shall be synchronized with the flow of aggregate to the mixing unit by an automatic, interlocking control. This control shall be capable of being easily and accurately adjusted. Means shall be provided for accurately checking the rate of flow of bitumen into the mixture.

(5) Mixing Unit. The plant shall include a continuous mixer of an approved type, adequately heated, and capable of producing a uniform mixture within the job-mix variation.

The mixer shall be equipped with a discharge hopper with dump gates that will permit rapid and complete discharge of the mixture. The paddles shall be adjustable for angular position on the shafts and reversible to retard the flow of the mix. The mixer shall have a manufacturer's plate giving the net volumetric contents of the mixer at the several heights inscribed on a permanent gauge. Charts shall be provided showing the rate of feed of aggregate per minute for the aggregate being used.

(6) Aggregate Sampling Device. An approved sampling device that is capable of providing a representative sample of dried aggregate shall be provided when the plant is operated utilizing plant screens. When cold feed controls are used, an approved sampling device capable of providing a representative composite sample shall be provided at a point just prior to the aggregate entering the dryer.

(D) Dryer Drum Mixing Plant.

(1) Cold Feed Control. The cold feed control requirements specified in Article 30.03 (A)(12) shall be used with dryer drum mixing.

(2) Calibrated Cold Feed Proportioning. The cold feed shall be capable of being calibrated to assure full control of the mix gradation.

(3) Weight Measurement of Aggregate. Positive weight measurement of the combined cold feed must be maintained to allow regulation of the feed gate and to permit automatic correction for variations in load.

(4) Synchronization of Aggregate Feed and Bituminous Material Feed. The bituminous feed control shall be coupled with the total aggregate weight-measurement device to produce a uniform percent of asphalt in the mix by automatically compensating for weight variations in the cold feed coupled with the predetermined moisture content in the aggregate.

(5) Aggregate Sampling Device. An approved sampling device that is capable of providing a representative composite sample shall be provided at a point just prior to the aggregate entering the dryer drum mixer.

(E) Storage and Surge Bins.

(1) General. Storage or surge bins for hot bituminous mixture may be used for the purpose of balancing production capacity with hauling and placing capacity.

If the use of a hot mix storage or surge bin causes segregation, excessive heat loss, or in any way adversely affects the quality of the bituminous mixture, as determined by the engineer, its use shall be discontinued until corrective action has been taken. All unsuitable mix shall be disposed of by the contractor.

(2) Low Level Indicator. Each storage and surge bin shall be equipped with a low level indicator and automatic cutoff system, which will stop the discharge of mix from the bin when the mix falls below the top of the discharge cone.

Withdrawal of material below the level of the discharge cone will be allowed only to clear the bin at the close of a day's work or to clear the bin in the event of a mixing production delay in excess of the maximum allowable storage time determined by the engineer.

(3) Loading and Unloading. Storage and surge bins shall be so designed, equipped, and operated to prevent segregation of completed mixture as it is discharged into the bins.

The storage and surge bin unloading gates may be clam gates operating under gravity feed or any other type gate that will not cause segregation or be detrimental to the mix in any way.

(4) Storage Time. The engineer will determine the maximum permissible bin storage time. Subject to all of the specified requirements for the hot bituminous mixture, a maximum bin storage time of 2 hours without withdrawal will be permitted initially until sufficient data and experience with any particular facility are available for the engineer to determine a maximum permissible storage time under given conditions.

All bins shall be emptied at the close of work each day.

(F) Roadway Equipment.

(1) Pavers. Spreading, shaping, and finishing of the surfacing course or courses of bituminized mixture shall be done by one or more self-contained, self-propelled units or pavers operated in such manner that no supplemental spreading, shaping, or finishing will be necessary to provide the surface smoothness required. Pavers shall contain an integral activated screed or strike-off assembly, heated if necessary. Pavers shall be capable of spreading and finishing the surfacing course to not less than the full width of a traffic lane and from 3/4 to 6 inches in depth, true to line, grade, and crown of the section specified by the plans.

Extensions and cut-off shoes shall permit changes in widths by increments of 1 foot or more. Screed extensions shall be matched by equal length of auger extensions.

The screed or strike-off assembly shall produce a finished surface of the required smoothness and texture without tearing, shoving, or gouging.

Pavers shall be equipped with a system that automatically controls the transverse slope and the screed elevation. The screed elevation shall be controlled through a sensing device at either side of the paver, receiving grade information from an independent grade-line control or a mobile grade reference. The mobile grade reference shall consist of a rigid beam, rail, ski, or taut string line or wire attached thereto, or from other approved mobile reference devices attached to the paver. The mobile grade reference shall have an effective length, as rated by the manufacturer or determined by the engineer, of not less than 50 feet.

When a mobile grade reference device is being used, the above-described 50-foot device shall be used when placing the first lane or strip of each lift of plant mix base or surfacing. When placing the remainder of the lanes or strips of each pavement lift, a ski or a beam with shoes, either of which having an effective length of not less than 10 feet, may be used as the mobile grade reference device, with an adjacent lane or strip of pavement serving as the grade-line reference.

The system shall maintain the desired transverse slope regardless of changes in screed elevation and shall be equipped with controls to permit the adjustment of the slope throughout superelevated curves.

In the event of failure of automatic controls, the contractor will be permitted to finish the shift, not to exceed 4 hours, using manual controls; but he will not be permitted to resume operations until the automatic controls are repaired. The use of the automatic controls may be waived on irregular sections or other sections where their use is deemed impractical.

The paver shall include a device for forming beveled edges of the surfacing courses when required.

Pavers shall have power adequate for efficient operation on ascending grades of 7 percent while pushing a loaded truck. Pavers shall have quick, positive steering ability and shall operate at speeds commensurate with the rate of delivery of the mixture to the paver and shall be coordinated to provide a uniform rate of placement without intermittent operation of the paver.

The plant mix material may be dumped directly into the paver hopper or placed in windrows ahead of the paver.

The receiving hoppers of pavers shall have sufficient capacity to avoid decreases in paver speed while receiving loads. Unnecessary delays in dumping trucks shall be avoided.

(2) Trucks. The beds of hauling vehicles shall be tight, clean, and smooth. Beds shall be sprayed lightly with limewater, soap, or a detergent solution, as necessary. Oil or diesel fuel or other petroleum solvents shall not be used. All excess solution remaining on a vehicle bed shall be properly disposed of before loading of that vehicle is permitted.

Any truck that causes excessive segregation, undue delays, or shows detrimental oil leaks will be discharged from the work until such conditions are corrected. When necessary, each load shall be covered with canvas or other approved material of sufficient size to protect the mixture from dust, foreign materials, or the weather. Truck beds shall be insulated and covers securely fastened to protect the mixture from excessive heat loss, if necessary to meet the temperature and density requirements of Article 30.07(G).

(3) Rollers. All rollers used shall be self-propelled and shall meet the requirements of Subsection 13.10, except as provided below:

Vibratory rollers shall be operated at speeds that provide not less than 8 vibrations per linear foot of pavement, based on the manufacturer's rated vibration frequency.

All types of rollers shall be equipped with self-cleaning devices and suitable means for evenly watering roller surfaces. Steel surfaces shall be free from flat areas, grooves, or projections that would mar the surface of the pavement. The use of equipment that results in excessive crushing of the aggregates will not be permitted.

30.04 AGGREGATE PRODUCTION AND STOCKPILING. Aggregate production and stockpiling shall meet the requirements of Section 26 and the following:

Crushed aggregate for plant mix base may be placed into a single stockpile.

Crushed aggregate for plant mix surfacing shall be separated into two or more general coarse and fine size ranges of different gradation and placed in separate stockpiles. Screens used for the separation shall be of the contractor's choice and may include slotted screens; however, no slotted screen shall be used that will permit passage of material that would normally be retained on a square opening equivalent to the maximum size aggregate being produced. The aggregates shall be separated such that when finally combined to meet the specified over-all gradation the proportion of the quantity used from any one stockpile to the total quantity used from the other stockpiles shall not be less than 17 percent, or one part to five parts.

When a representative volume of material has been produced, the engineer will determine the average percentage of material passing the No. 4 sieve in each stockpile. This average percentage will be established as a target value to be maintained, within a tolerance of plus or minus 7 percentage points, for the remainder of the aggregate produced from that aggregate source for each stockpile.

The aggregate shall be transferred from the stockpiles in such a manner that uniform grading of the material is preserved.

30.05 PREPARATION OF AGGREGATE.

(A) General. Aggregate shall be delivered to the plant from a stockpile or stockpiles prepared before mixing operations. The quantity of stockpiled material shall be sufficient for at least one day of mixing plant operations. The mixing plant shall not be charged with aggregates coming directly from crushing or screening plants or combination of these plants.

Blending Material (not mineral filler), if required to meet the grading requirements, shall be uniformly proportioned and blended with the aggregate.

(B) Batch and Continuous Flow Plants. Aggregates shall be dried and heated in the dryer so that when delivered to the mixing unit they shall be at as low a temperature as is consistent with proper mixing, laying, and compaction. In no case shall the temperature of the aggregate when introduced into the mixing unit exceed 325 degrees F. Flames used for drying and heating shall be properly adjusted. Heat shall not damage the aggregate. Visible, unburned oil or carbon residue shall not be left on the aggregate.

Drying shall continue for a sufficient time and at a sufficiently high temperature, consistent with this specification, to cause the aggregate to become thoroughly surface-dry. If the bituminized mixture contains evidence of excessive moisture, such as foaming on the surface of the coarse aggregate particles, excessive slumping of the mix in the truck, condensed water dripping from the truck box, bubbles or blisters forming on the surface immediately behind the paver, or any other visual indications, the engineer will require the moisture content to be lowered.

Batch or continuous flow plants operating without cold feed controls shall have a sufficient number of bins to adequately store aggregate to permit re-combining of the aggregate in the proper proportions to meet the job mix formula.

Batch or continuous flow plants operating with cold feed controls shall meet the requirements of Article 30.03 (A)(12).

(C) Dryer Drums. If required by the engineer to obtain a satisfactory mixture, moisture shall be added to the aggregate before introduction into the dryer drum mixer at no additional cost to the Department.

30.06 PREPARATION OF BITUMINOUS MIXTURE.

(A) All Plants. When mineral filler or hydrated lime is required, it shall be stored in a separate bin and fed directly into the mixing unit or weigh box separately from the other aggregates and prior to the addition of bituminous material. The rate of feed shall be controlled to provide a uniform weight of mineral filler into each batch or load.

If no provision is made to weigh the mineral filler with the other aggregates in the weigh box at the mixing plant, the proportions of mineral filler shall be determined on a weight basis and shall be measured separately from the other aggregates. After the proportions of mineral filler have been determined, the material may be added to the mixture at the mixing plant by volume or weight measurement.

Mixing shall produce a homogeneous mixture in which all aggregate particles are thoroughly and uniformly coated with bituminous material.

A mixture will be considered unsatisfactory if it shows an incorrect quantity of asphalt, has been injured or damaged by burning, is improperly mixed, or does not meet specification requirements after mixing. An unsatisfactory mixture shall be disposed of before placement or removed and replaced if detected in the roadway. Removing, replacing, or disposing of unsatisfactory material shall be at no cost to the Department.

(B) Batch and Continuous Flow Plants.

(1) General. The hot aggregate shall be accurately measured and conveyed into the mixing unit in the proportionate quantities of each aggregate required to meet the specified grading. The aggregate shall be introduced into the mixing unit at a temperature of:

- a. Not more than 225 degrees F when cutback liquid asphalt is used, and
- b. Not more than 325 degrees F when asphalt cement or slow-curing liquid asphalt is used.

IN NO CASE shall the asphalt be introduced into the mixing unit at 25 degrees or more below the temperature of the aggregate.

The bituminous mixture, immediately after mixing, shall be within the temperature range specified in the data on "temperature-viscosity" furnished for the bituminous material used.

(2) Mixing Time. The minimum mixing time shall be 25 seconds. If necessary, the engineer may require more than 25 seconds of mixing in order to obtain a satisfactory mix.

Mixing time in seconds for continuous flow plants equals "pugmill dead capacity in pounds" divided by "pugmill output in pounds per second".

(C) Dryer Drums. The temperature of the bituminous mixture at discharge from the mixer will be established by the engineer and will be between 225 and 265 degrees F.

The moisture content of the bituminous mixture at discharge from the mixer shall be not less than 1 percent nor more than 3 percent when tested in accordance with MT-312.

30.07 CONSTRUCTION REQUIREMENTS.

(A) Surface Conditions and Weather Limitations. The bituminous mixture shall not be placed on a wet surface, on an unstable roadbed, or when weather conditions prevent the proper handling or finishing of the mixture. Bituminous mixture shall not be placed when the base temperature is less than 30 degrees F.

(B) Existing Surface Preparation. Preparation of the existing surface shall be performed in accordance with the requirements of Subsection 19.20.

(C) Prime and Tack Coat. Prime or tack coat, when required, shall be in accordance with the applicable requirements of Sections 31 and 32. Prime coat shall be applied prior to application of the plant mix material at the rate directed.

The plant mix pavement shall not be placed until the prime coat has cured a minimum of 24 hours or longer, as directed.

Plant mix pavement shall not be placed on any primed surface that contains free moisture, as determined by the engineer.

A tack coat shall be placed on existing pavement that is being overlaid and between lifts when plant mix pavement is constructed in more than one lift.

(D) Protection of Traffic and Roadway Structures.

(1) Traffic protection shall be performed in accordance with the provisions for traffic control, Article 04.04 (C)(5), and the traffic control plan. At the conclusion of the day's work, all equipment shall be removed from the road, a minimum of 30 feet from outside edges of the traveled lane.

(2) Protection of highway structures shall be performed in accordance with Article 32.05(B).

(E) Spreading and Finishing. Placing of the mixture shall be done on an approved surface. The mixture shall be spread with pavers over the entire width or such partial width as may be practical. Material for shoulder widening may be placed with other approved equipment.

The bituminous mixture shall be transported and placed on the roadway in such a manner as to minimize segregation. All segregated areas behind the paver shall be removed immediately at the time of discovery. The segregated material shall be replaced with specification material before the initial rolling has taken place. The contractor will not be allowed additional compensation for correction of segregated areas.

Plant mix bituminous surfacing shall be constructed in compacted lifts not exceeding 0.20 feet in thickness.

Plant mix bituminous base shall be constructed in compacted lifts not exceeding 0.35 feet in thickness. However, any lift of plant mix base that is to be a riding course shall not exceed 0.25 feet in thickness.

The engineer will establish horizontal alignment controls for spreading each course. The contractor shall set a string based on this control and cause one edge of the first lane of each lift of surfacing to parallel the string.

On small areas, irregular areas, approaches, turnouts, around manholes, inlets, walls, and on other areas not readily accessible by a paver, plant mix material may be spread to the required thickness by special pavers or by other methods. Compaction of mix on such areas shall be done as directed.

Hauling over any plant mix surfacing or base course will not be permitted until the mixture has been properly compacted and has cooled sufficiently to prevent damage to the new pavement.

(F) Joints. Placing of each course shall be as continuous as possible. The width of each course shall be adjusted so that longitudinal joints in successive lifts are offset by at least 6 inches. Transverse joints in successive lifts shall be offset at least 6 feet.

Special care shall be taken in construction of transverse joints. The completed side of the joint shall be checked and shall be cut back if necessary to conform to surface-smoothness requirements before any fresh mixture is placed. After placing the mixture, all efforts shall be directed toward completing the joint area to conform to the following requirements: The joint area will be checked with a 20-foot string line. The joint area and the first 60 feet of finished, new pavement surface shall not deviate from the string line by more than $\frac{3}{16}$ inch in any 10-foot length and no more than $\frac{3}{8}$ inch in any 20-foot length. The string line shall be centered on the joint initially and shall be advanced in 10-foot increments until the first 60 feet of new pavement have been checked. If the above requirements are not met, paving operations will be suspended until the section described is corrected and complies with these requirements.

Longitudinal and transverse joints shall be formed with reasonable care and precision of workmanship. Joints with ridges or depressions that exceed the surface tolerance shall be corrected. Joints with accumulations of mud, dust, or other foreign matter shall be cleaned or trimmed back as directed before placing the adjoining material. The exposed face of all joints, except those formed by echelon paving, shall have a coat of SS-1 emulsified asphalt or other approved bituminous material applied just before placing the abutting course.

Longitudinal joints in the top course of plant mix shall be constructed at the centerline or lane line. If those locations are not practicable, the joint may be constructed near the center of the lane.

A transverse joint shall be made in a course if laying of that course is to be discontinued long enough to let the mixture cool below 175 degrees F. The transverse joint may be formed or cut, but it shall result in a vertical face the full depth of the course. Material that is cut away to make the vertical face shall be removed, the joint face brushed with asphalt, and the fresh mixture compacted against the joint face when paving is resumed.

If it is necessary that traffic be maintained on a roadway that is being paved, the paving shall be accomplished in such a manner that pavement lanes, including shoulders, are brought up approximately even at the end of each day's paving, in order to minimize an abrupt longitudinal joint. The ends of paving courses shall be beveled at the approximate ratio of 20 horizontal to 1 vertical to prevent abrupt transverse joints. When paving of the courses resumes, transverse joints shall be constructed.

Appropriate signing shall be placed near the end of the new pavement at the close of work each day.

Joints at bridge ends or other rigid structures shall be made by first conditioning and compacting the existing base. The mixture shall be placed slightly higher than the structure. Compaction shall be in the transverse direction as well as the longitudinal and as directed.

(G) Compaction. Immediately after the bituminous mixture has been spread and struck off and the surface irregularities adjusted, it shall be thoroughly and uniformly compacted by rolling. Rolling shall be continued while the mixture is in a workable condition and shall provide at least 95 percent of the density of a test specimen made from the mix used at the job site. Test specimens will be prepared in the field and tested for density according to MT-306. Field density determinations will be performed with a nuclear field density device in accordance with MT-212.

Rollers shall be operated at speeds slow enough to minimize displacement of the bituminous mixture.

Breakdown rolling shall be done as soon as the mixture will support the roller without undue displacement, transverse cracking, or hairline checking.

Finish rolling shall begin as soon as possible after the breakdown rolling and continue until all roller marks are eliminated or until the engineer determines that sufficient rolling has been done. Finish rolling shall be completed the same day the mixture is placed.

The 95 percent of density requirement shall be obtained by the time the spread bituminous mixture reaches a minimum temperature of 175 degrees F. Failure to achieve the required density before this minimum temperature is reached shall be cause to require discontinuance of paving operations.

The number, weight, and type of rollers furnished shall be sufficient to obtain the required compaction and finishing without undue displacement, cracking, or shoving. When directed, the number of rollers shall be increased to keep pace with production.

Unless otherwise directed, rolling shall begin at the sides and proceed longitudinally parallel to the road centerline, each trip overlapping one-half the roller width. Rollers shall move at a slow, uniform speed with the drive wheel nearest the paver except on steep grades.

When the pavement is placed by machines in echelon or abutted against a previously placed lane, the longitudinal joint shall be rolled first, followed by the regular rolling procedure. On superelevated curves, the rolling shall begin at the low side and progress to the high side, overlapping longitudinal trips parallel to the centerline.

Any displacement occurring as a result of the reversing of the direction of a roller or from other causes shall be corrected at once, before final compaction. Care should be exercised in rolling so as not to displace the line and grade of the edges of the bituminous mixture.

Any mixture that becomes loose and broken, mixed with dirt, or is in any way defective shall be removed and replaced with fresh, hot mixture and compacted, all at no cost to the Department.

(H) Control Strip. The control strip method for determining density requirements shall be used when the contractor cannot meet the 95 percent density requirement. The control strip method shall not be utilized, however, until the contractor has satisfactorily demonstrated that other remedies will not achieve the 95 percent density requirement. These remedies shall include but are not limited to the following:

1. Increase compaction effort by change in size, type, number, pattern, and operation of rollers.
2. Mix gradation change.
3. Mix temperature change.
4. Mix asphalt content change.
5. Mix moisture content change.

Each control strip shall be constructed with approved bituminous mixture and shall remain in place as a section of the completed work. Each control strip shall be one paver-width wide, at least 100 feet long, and of the depth specified for each lift.

Equipment proposed for use in the compaction of control strips shall be approved by the engineer prior to use. Compaction of control strips shall be accomplished in accordance with the requirements of Article 30.07 (G).

During the rolling process the density of the control strip will be determined by the engineer with a portable nuclear test device. When the engineer determines that the increase in density is less than 1 pound per cubic foot per coverage, the rolling shall be stopped. The mean density of the control strip will be determined from five tests at randomly selected test sites within the control strip. If the mean density of the control strip, as described above, is not achieved by the time the spread bituminous mixture reaches a temperature of 175 degrees F, a new control strip shall be constructed.

One control strip shall be constructed at the beginning of work on each roadway and each lift of each course. An additional control strip shall be constructed when a change is made in the type or source of material or whenever a significant change occurs in the composition of the material from the same source.

A new control strip may also be ordered by the engineer or requested by the contractor when:

1. A change in the material or job mix formula is made.
2. Ten days of production have been accepted without construction of a new control strip.
3. There is reason to believe that a control strip density is not representative of the material being placed.

The required compaction of the remainder of the course shall be governed by the mean density of the control strip until a new control strip has been constructed. The remainder of the course shall be divided into sections approximately 2,000 feet long for the purpose of defining areas represented by each series of density test sections. The same procedure and rolling equipment used on the control strip shall be used on the test sections, including the requirement that the required density be obtained by the time the spread bituminous mixture reaches a minimum temperature of 175 degrees F.

The density of each test section will be evaluated based upon the results of five tests with a portable nuclear test device performed at randomly selected sites within the test section. The mean density obtained for the five tests in each test section shall be at least 98 percent of the mean density obtained in the approved control strip. In addition, each individual test value obtained within a test section shall be at least 96 percent of the mean density of the control strip.

The contractor shall continue his compactive effort as directed until the required density is obtained.

Acceptance density testing shall be accomplished while the bituminous mixture is hot enough, 175 degrees F minimum, to permit further densification, if such is shown to be necessary.

(I) Pavement Repair. If repairs are made by cutting out the pavement, the sides and bottom of the hole shall be cleaned and brushed with an approved bituminous material. Fresh mixture shall then be placed into the hole, compacted, and leveled to meet the required surface smoothness.

(J) Surface Tolerances. The finished surface will be inspected for conformance to specified grade and typical section. Testing will be with a 10-foot straightedge paralleling the center of the roadway. The variation of the surface from the testing edge of the straightedge between any contact points with the surface shall conform to the following tolerances:

1. Three-sixteenths inch maximum on finished plant mix surfacing pavement and on plant mix base pavements that are to be either temporary or permanent wearing courses.
2. Three-eighths inch maximum on plant mix base pavements that will subsequently be covered with a plant mix surfacing wearing course.

All work not meeting surface tolerance requirements shall be corrected as ordered.

30.08 METHOD OF MEASUREMENT.

(A) Plant Mix Surfacing and Base. The plant mix surfacing and plant mix base materials will be measured by the ton on approved scales after complete mixing of all ingredients. The pay weight will include the bituminous material and any mineral filler or hydrated lime contained in the mixture. In lieu of platform scales, batch weights in automated batch plants are permitted as a method of measurement, in which case the cumulative weight of all batches will be used for payment, less any rejected loads.

Batch weight tickets shall be issued for each load when the batch plant is equipped with an automatic printer system as described in Article 30.03 (A)(10).

For automatic batch plants not equipped with automatic printing systems, a batch counter shall be utilized. The engineer will record the batch counter reading at the beginning and finish of each day's production.

The recorded weight shall be accurate to within 0.5 percent of the true weight. The engineer may require random loads to be checked on approved platform scales.

(B) Bituminous Material. Bituminous material will be measured by the U.S. gallon or by the ton in accordance with Article M-120.04 less the quantity of anti-stripping additive, if used.

(C) Mineral Filler. Mineral filler will be measured by the ton in accordance with Article 09.01.

(D) Hydrated Lime. Hydrated lime will be measured by the ton in accordance with Article 09.01.

(E) Anti-Stripping Additive. Anti-stripping additive will not be measured for payment.

30.09 BASIS OF PAYMENT.

(A) Plant Mix Surfacing and Base. Plant mix surfacing and plant mix base material used in the completed and accepted work will be paid for at the contract unit price per ton. This price and payment, except as may be otherwise specified, will be full compensation for the work, including the furnishing and adding of blending material, if necessary, compaction of the specified course, and the cost of constructing density control strips.

The contractor will not be allowed payment for any claim for the rejection of any batch or load of mixture that contains a quantity of bitumen varying more than five-tenths of 1 percent from the percentage established by the job mix formula.

(B) Bituminous Material. Bituminous material used in the accepted mixture, for tack or prime coat, and for painting joints, gutters, headers, manholes, curbs, and the like, will be paid for at the contract unit price per U.S. gallon or per ton in accordance with Article M-120.05. Such price and payment shall include all operations necessary to complete the work.

(C) Mineral Filler. Mineral Filler will be paid for at the contract unit price per ton, except as otherwise specified. Payment will be full compensation for furnishing, hauling, and incorporating the mineral filler into the bituminous mixture.

If mineral filler is required to be used in the bituminous mixture but not specified in the contract, then the unit price paid per ton of mineral filler will be the invoice price per ton, delivered on the project, plus \$4. The additional \$4 per ton shall be full compensation for incorporating the mineral filler into the bituminous mixture.

Invoice prices shall be supported by certified copies of invoices.

(D) Hydrated Lime. If the contract specifies hydrated lime as a chemical additive, the contract unit price per ton shall include all costs associated with furnishing, hauling, and incorporating hydrated lime into the bituminous mixture.

If hydrated lime is required but the contract does not specify hydrated lime, then payment for hydrated lime will be at the invoice price per ton, delivered on the project, plus \$4. The additional \$4 per ton shall be full compensation for incorporating the hydrated lime into the bituminous mixture.

Invoice prices shall be supported by certified copies of invoices.

(E) Anti-Stripping Additive. When anti-stripping additive is required, payment will be at the refinery invoice price per ton for the furnishing, mixing, and proper blending of the additive with the bituminous material. Such price and payment shall be full compensation for the item.

Invoice prices shall be supported by certified copies of invoices.

Page 225

31.06 TRAFFIC CONTROL AND PROTECTION OF HIGHWAY STRUCTURES.

Rescind the last two sentences in this article.

Page 248

Insert new section as follows:

SECTION 35 OPEN-GRADED FRICTION COURSE

35.01 DESCRIPTION. Open-graded friction course (OGFC) shall consist of a mixture of mineral aggregate and bituminous binder, mixed at a central mixing plant,

spread, and compacted on the prepared surface of an existing roadway pavement in accordance with these specifications and in reasonably close conformance with the details, lines, grades, and dimensions shown on the plans or established by the engineer.

35.02 MATERIALS.

(A) Aggregate. The aggregate shall be composed of clean, hard, durable fragments of crushed stone or crushed gravel, plus filler fragments of finely crushed gravel, crushed stone, or sand, as necessary to provide a material that will meet the following gradation requirements as determined by MT-202.

<u>Sieve Designation</u>	<u>Percent by Weight Passing Square Mesh Sieves</u>
3/8"	100%
No. 4	30-50%
No. 8	5-15%
No. 200	0-5%

At least 70 percent of the aggregate retained on the No. 4 sieve shall have at least one fractured face.

The aggregate must be of good quality and shall be produced from crushing plus-3/4-inch material.

The aggregate shall have a percentage of wear of not more than 40 at 500 revolutions as determined by MT-209.

The aggregate shall be free of vegetable matter, lumps or balls of clay, adherent films of clay, or other material that will prevent thorough coating with asphaltic material.

(B) Bituminous Material. The bituminous materials shall be of the type and grade shown on the plans and shall comply with the requirements of Section M-120.

The percentage of bituminous material by weight will be as shown on the plans or as adjusted by the engineer.

An anti-stripping agent may be required to improve the coatability of the aggregate. The amount and type of additive to be used will be determined by the engineer.

35.03 EQUIPMENT. The mixing plant, paver, and other associated equipment, except rollers, shall meet the applicable requirements of Section 30.

Rolling shall be accomplished with a nonvibrating, flat, smooth, steel-wheeled, self-propelled roller weighing not more than 10 tons. Rollers shall be of such weight as to obtain good consolidation without undue breakage of the aggregate.

35.04 CONSTRUCTION METHODS.

(A) Preparation of Existing Surface. Any preliminary patching, leveling, or crack filling shall be accomplished before placement of the OGFC. Holes and depressions shall be cleaned of all loose and defective material to sound pavement, coated with an approved bituminous material, and filled with a proper hot-mix asphalt patching material. Patched areas must be compacted to produce a tight, smooth surface conforming to the adjacent pavement area.

Contact surfaces of curbing, gutters, manholes, and other structures shall be painted with a thin coating of bituminous material prior to OGFC being placed against them.

New plant mix bituminous surfacing shall be allowed to cure a minimum of 10 days prior to placement of the OGFC.

Immediately prior to the first application of bituminous material, all dust, dirt, and foreign matter shall be removed from the roadway surface by means of a power broom, blower, hand broom, or other methods necessary to produce a clean surface.

(B) Weather Limitations. Open-graded friction course shall be placed only during daylight hours, when the mat surface on which it is to be placed is dry, when the temperature of the mat is not less than 60° F, and when the air temperature in the shade is above 60° F.

OGFC shall not be placed when the weather is rainy or stormy, and in no case will the contractor be permitted to place OGFC when the engineer determines that weather conditions are unfavorable for obtaining satisfactory results.

(C) Tack Coat. A tack coat consisting of 0.02 to 0.05 gallon per square yard of SS-1 Emulsion shall be applied as directed by the engineer.

In order to obtain complete coverage, it may be necessary to dilute the emulsion with water. When this is done, a proportionally greater amount of the diluted emulsion is to be applied.

(D) Mixing. Operation of the hot-mix plant shall insure coordination of drying, screening, proportioning, and mixing operations, so a satisfactory OGFC material is produced. The plant shall be operated only at capacities that will permit such coordination.

The mineral aggregate shall be dried and heated to a temperature not to exceed 275° F. Dust resulting from this operation shall be collected and either wasted or returned to the hot elevator as deemed necessary.

The temperature of bituminous materials shall not exceed 275° F when introduced into the mixture.

The mineral aggregate and asphalt cement shall be mixed until all aggregate particles are thoroughly and uniformly coated with asphalt cement. Mixing temperatures shall be between 240° F to 275° F, as directed by the engineer. The mixture, when delivered to the paver, shall be at a temperature of not less than 225° F.

An anti-stripping additive, if required by the engineer, shall meet the requirements of Article 30.02 (F)(2).

(E) Dumping. The open-graded friction course mixture may be dumped directly into the paver hopper or placed in windrows on the pavement ahead of the paver.

(F) Spreading. The open-graded friction course shall be placed with a paver or pavers meeting the requirements of Article 30.03 (F)(1). Longitudinal and transverse joints shall conform to the requirements of Article 30.07 (F).

(G) Rolling. Immediately following placement of the open-graded friction course material, the surface shall be given one complete rolling. Rolling shall be in a longitudinal direction, beginning at the outside edge and progressing towards the center, and on curves, at the lower side and proceeding toward the higher side. Each pass of the roller shall overlap the preceding pass by at least one-half the width of the roller. Rolling operations shall be conducted in such a manner that shoving, distortion, or stripping will not develop beneath the roller. Rolling shall be confined to the amount necessary to consolidate the

OGFC and bond it to the underlying surface course. Excessive rolling shall be avoided.

(H) Finishing. The surface shall be finished smooth, true to the dimensions shown on the plans. Any low or defective areas shall be corrected immediately. Defective areas shall be removed and replaced with new material, and the new material shall be compacted to conform to the remainder of the pavement. Such work shall be done at no cost to the Department. The completed OGFC shall be protected from all traffic until it has set up and sufficiently hardened to resist abrasion.

(I) Surface Tolerances. The finished surface will be inspected for conformance to the requirements of Article 30.07 (J).

35.05 METHOD OF MEASUREMENT. Open-graded friction course will be measured in accordance with the applicable provisions of Article 30.08.

35.06 BASIS OF PAYMENT. The accepted quantities of open-graded friction course, measured as specified, will be paid for at the contract unit price for each ton of OGFC mixture. Mineral filler and anti-stripping additives, if used, will be paid for as specified in Article 30.09. Bituminous material used in the accepted OGFC and tack coat will be paid for at the contract unit price in accordance with Article M-120.05.

Page 270

39.05 OPENING TO TRAFFIC.

Rescind the first sentence and replace with the following:

39.05 OPENING TO TRAFFIC. Opening to traffic, including the contractor's vehicles, will not be permitted until the longitudinal joints have been completed and the compressive strength of 6- x 12-inch cylinders tested in accordance with AASHTO T22 is at least 3,000 pounds per square inch and the flexural strength of concrete beams (dimensions described in MT-101 of the Materials Manual) tested in accordance with AASHTO T97 (ASTM C 78) is at least 500 pounds per square inch.

Page 278

40.03 (A)(3) The contractor shall...

Rescind the first sentence and replace with the following:

(3) The contractor shall be responsible for producing concrete having the required minimum compressive strength and the minimum flexural strength in the case of Class AP or DP concrete.

Page 279

40.04 MATERIAL.

TABLE 1 - CONCRETE PROPORTIONING TABLE on page 280 shall be revised as follows:

Under the heading "Class", preface AP and DP with an asterisk and *Pre with an additional asterisk.

Below the table, add the following paragraph to define the single asterisk:

*Concrete for Portland Cement Concrete Pavement. The 28-day flexural strength requirement shall be 500 psi minimum, as determined by the AASHTO T97 (ASTM C 78) method.

Preface the present paragraph (*Concrete for Prestressed Beams...) with an additional asterisk.

Page 291

40.05 (E) Curing Concrete.

In the second paragraph of this article, change the number at the end of the second line to be "12" instead of "24". The sentence should read: "...shall be removed in not less than 12 nor more than 48 hours...".

Page 292

40.05 (E)(2) Impervious Membrane Curing.

Add the following as the second sentence in this article:

Membrane curing compound used on deck slabs shall be Type 2, white pigmented, and membrane curing compound for other use shall be Type 1-D, clear or translucent with fugitive dye.

Page 293

40.05 (E)(3) Water Soluble Liquid Membrane Curing.

Add the following as the second sentence in this article:

Water soluble liquid membrane-forming compound used for deck slabs shall be white pigmented.

Page 294

40.06 (A) Testing.

Rescind this article, including the title, in its entirety and replace with the following:

(A) Compressive Strength Testing.

(1) General. A compressive strength sample shall consist of three or more test cylinders made at the same time from the same batch of concrete. These cylinders may be broken at various ages to determine strength gain and to maintain job control. Standard compressive strength tests will be made at 7, 14, and 28 days, except as specified below for concrete used in prestressed members. The compressive strength results from one or a combination of the cylinders tested may be used to determine whether concrete meets the required compressive strength shown in TABLE I of Article 40.04. Test cylinders shall be cast and cured in accordance with MT-101. Concrete cylinders shall be tested in accordance with AASHTO T22.

(2) Prestressed Concrete Members. Standard compressive strength tests for Class "Pre" concrete will be made at 7 days and 28 days of age. Two cylinders shall constitute the 28-day test. The average of the strengths of the two 28-day cylinders will be used to determine acceptability under the requirements

of Article 40.06 (B). The contractor may cast additional test cylinders for back-up purposes. In order to be considered for acceptance, back-up cylinders shall be cast from the same batch of concrete used for the normal acceptance cylinders. The back-up cylinders shall be cast and cured in accordance with MT-101 & MT-111. The plant inspector will witness the casting and mark the cylinders for identification purposes. When it becomes necessary, back-up cylinders shall be tested no later than 5 days after the normal 28-day test.

(B) Flexural Strength Testing. In addition to the requirements above for compressive strength testing, the Class AP and DP portland cement concrete pavement will require that beams be made to test the flexural strength of concrete. The number of flexural strength tests will be determined by the Department of Highways Materials Bureau on a random basis. The flexural strength results from one or a combination of the beams tested may be used to determine whether concrete meets the required flexural strength shown in TABLE 1 - CONCRETE PROPORTIONING TABLE of Article 40.04. Flexural beams made in the field will be cast and cured in accordance with MT-101. Testing of the flexural beams will be in accordance with AASHTO T97 (ASTM C 78).

Re-number Articles 40.06(B) and 40.06(C) to be Articles 40.06(C) and 40.06(D) respectively.

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40.06 (B)(5) Concrete represented by...

Add the following as the second paragraph of the article:

Procedures to evaluate concrete in place shall be approved by the Department. Such procedures shall be submitted in writing within 7 days after the last compression test representing the specific member. The written procedure shall contain details of sampling methods including sample locations, test methods and conditions, and proposed criteria to evaluate test results. In general, non-destructive test methods such as the Swiss hammer and the Windsor probe will not be considered. The evaluation procedure shall be approved in writing prior to any sampling or testing of concrete in place.

40.07 METHOD OF MEASUREMENT.

Change the article to read as follows:

40.07 METHOD OF MEASUREMENT. The method of measurement will be in accordance with Article 41.05, except that Class AP and DP concrete will be measured in accordance with Article 39.08.

40.08 BASIS OF PAYMENT.

Change the article to read as follows:

40.08 BASIS OF PAYMENT. The basis of payment will be in accordance with Article 41.06, except that Class AP and DP concrete will be paid for in accordance with Article 39.09.

41.04 (E)(2) Pumping Concrete.

Add the following between the first and second paragraphs:

Concrete pump discharge lines shall not be less than 5 inches in diameter from pump to point of deposit.

41.04 (F) Depositing Concrete Under Water.

Rescind this article in its entirety and replace it with the following:

(F) Depositing Concrete Under Water. The contractor will be permitted to deposit Class "AS" or "DS" concrete for permissible seals shown on the plans. Concrete placed outside of the neat lines shown on the plans or as modified by the engineer and the change in the mix design for the seal will be for the contractor's convenience; and all costs connected therewith will be included in the contract unit price for Class "AD" concrete.

Concrete shall not be placed under water except as approved by the engineer. When it is impossible or inadvisable to dewater an excavation before placing concrete, a seal course of sufficient depth to thoroughly seal the cofferdam shall be placed under water by means of a tremie or concrete pump. The entire seal shall be placed in one continuous operation, and concrete placement shall meet the requirements set forth below. After sufficient time has elapsed to insure adequate strength in the concrete seal, the cofferdam shall be dewatered and the balance of the masonry or concrete shall be placed in the dry.

Concrete shall be placed under water by utilizing a conventional tremie system or by pumping into a conventional tremie hopper or by pumping directly to the point of deposit.

The conventional tremie system shall consist of a steel or other approved, rigid, watertight tube having a diameter of not less than 10 inches with a hopper at the top. The discharge end of the tremie shall be entirely submerged in the deposited concrete, and the tremie tube kept full to the bottom of the hopper at all times during the concrete placement operation. When a load is dumped into the hopper, the tremie shall be slightly raised to induce the flow of concrete until the load discharges to the bottom of the hopper. The flow is then stopped by lowering the tremie. The means of supporting the tremie shall permit free movement of the discharge end over the entire top of the work and shall permit it to be lowered rapidly when necessary to retard or stop the flow.

Pumping concrete shall meet the requirements of Article 41.04 (E) (2). When seal concrete is placed by pumping, the contractor shall have an additional concrete pump or conventional tremie equipment available at the job site to insure uninterrupted placement of the entire foundation seal in the event of concrete pump failure. When concrete is pumped into a conventional tremie, placement shall be as set forth in the preceding paragraph for conventional, tremie-placed concrete. When concrete is pumped directly to the point of placement, the discharge tube shall be a rigid pipe that extends a minimum of 5 feet above the water level when resting on the bottom of the excavation. That portion of the discharge line from the top of the rigid pipe to the concrete pump may be a flexible hose suitable for pumping concrete. Concrete pump discharge lines, flexible or rigid, shall not be less than 5 inches in diameter including that portion of discharge tube under water.

Concrete pump discharge tubes and tremie tubes used to deposit concrete under water shall be equipped with a device that will prevent water from entering the tube while it is being charged with concrete. The tubes shall be filled by a method that will prevent washing of the concrete.

Concrete deposited under water shall be carefully placed in a compact mass and shall not be disturbed after being deposited. Concrete shall not be placed in running water nor shall it be exposed to the action of water before attaining its final set. Still water shall be maintained at the point of deposit. Pumping from within the cofferdam to lower the water level will not be permitted while depositing concrete under water. Pumping to dewater a sealed cofferdam shall not commence until the seal concrete has set sufficiently to withstand the hydrostatic pressure. All form work designed to retain concrete under water shall be watertight. The method of depositing concrete shall be so regulated as to produce approximately horizontal surfaces.

Particular attention shall be given to that portion of the top of the foundation seal that constitutes a construction joint. That surface of the set concrete shall be prepared in accordance with Article 41.04 (G) before attempting to join fresh concrete to the seal concrete. Local high spots shall be removed by jackhammering or other approved methods as may be necessary to provide for proper clearances of reinforcing steel or projection of embedded piling.

Page 310

41.04 (L)(5) Concrete Bridge Decks.

Rescind Articles 41.04 (L)(5) and 41.04 (L)(5)(a) thru (e) and replace with the following:

(5) Concrete Bridge Decks. Deck slabs shall be finished by the machine method, with the exception of small or irregularly shaped areas where the use of a machine is impractical.

(a) Machine Method. A self-propelled transverse finishing machine shall be used to strike off and finish the surface of deck-slab concrete. The contractor shall furnish the engineer with information as to location and method of rail support, size of rail members, and detailed description of the machine.

The finishing machine shall be operated over the entire area of the deck segment to be finished prior to placing any concrete. This trial run shall be made with the machine and rails set to the proper grade and section and with a spacer attached to the bottom of the strike-off 1/8 inch in thickness less than the concrete cover shown on the plans. Support rails shall be adjusted to compensate for dead-load deflection in the bridge girders. Transverse strike-off support rails shall be adjusted as required to match any changes in the deck section. Transverse rail adjustments shall be made in increments to maintain specified surface tolerances. Trial run transverse rail adjustments shall be noted and retained for use during actual deck finishing operations. All adjustments necessary to maintain proper grade, section, concrete cover over slab reinforcement, and slab thickness shall be made before any concrete is placed.

As the concrete is placed it shall be given as many passes of the strike-off as necessary to obtain a smooth, even surface of the required profile and section. The heading of concrete placement shall be maintained nearly parallel to and not more than 10 feet ahead of the strike-off. At no time shall the quantity of concrete carried ahead of the strike-off be so great as to cause wheel slippage or other unsatisfactory operation.

Application of water to the surface shall be subject to the inspector's approval. If approved, water shall be applied in a fine mist in the minimum

amount necessary. Unauthorized or excessive application of water shall be grounds for rejection of the affected portion of the deck slab.

Unless otherwise approved by the engineer, the transverse axis of the finishing machine shall be oriented along lines parallel to centerline of bearing on all prestress and steel girder spans skewed more than 15 degrees. The heading of concrete placement shall be maintained nearly parallel to the strike-off heading to produce nearly equal loads on each girder.

(b) Hand Method. Any hand finishing on deck slabs shall be subject to the engineer's approval. Concrete shall be struck off with a template or vibrating screed. It shall then be finished to a smooth, even surface of the required profile and section by means of longitudinal and transverse floating. Power trowels will not be allowed.

(c) Straightedging. The contractor shall test the plastic concrete surface behind the finishing machine for surface smoothness with a 10-foot straightedge. The straightedge shall be placed in contact with the surface in successive positions parallel to centerline of roadway across the entire width of the slab. Advances longitudinally shall be in stages of not more than 5 feet.

Any depressions found shall be immediately filled with fresh concrete, consolidated, struck off, and finished. High areas shall be removed with a 10-foot cutting straightedge and refinished. Any other surface corrections shall be made with a 10-foot float or combination float and cutting straightedge. A footbridge resting on sideforms or finishing machine rails and spanning but not touching the fresh concrete shall be provided for straightedge testing and surface correction operations. The engineer may direct that additional footbridges be provided any time weather, concrete placement, or other conditions require it in order to complete finishing, texturing, or curing in a timely manner.

Straightedge testing and surface correction shall continue until the entire surface is free from observable defects and departures from surface-smoothness requirements. Hand floating shall be held to the minimum required to correct defects left by the finishing machine. Hand floating will not be required if the machine-finished surface meets surface-smoothness requirements and is free from holes, tears, open areas, ridges, or other defects.

(d) Bridge Deck Surface Texture. The final finish of the bridge deck shall be accomplished by texturing the concrete at the proper stage of consistency so that well-defined transverse grooves are formed. The grooves shall be formed with an approved comb or broom having in contact with the concrete a single row of steel tines spaced $3/4$ inch center-to-center. The tines shall be approximately 0.03 inch thick, 0.08 inch wide, and from 4 to 6 inches long.

The texturing device shall be operated from a footbridge. The time of application, the angle of tines with the surface, and the pressure on the concrete shall be varied as necessary to produce the deepest groove possible that will not flow together or tear the surface excessively and displace particles of coarse aggregate. The desirable groove depth is from $1/8$ to $3/16$ inch.

Successive passes of the texturing device shall not overlap. Grooves shall terminate 1 foot away from the face of any curb or barrier, and this area shall be left smooth.

Skewed bridge decks may be textured parallel to the heading of concrete strike-off and finishing.

The top surface of curbs, sidewalks, and bikeways shall be given a broom texture.

The allowable variation in specified surface smoothness shall be independent of the grooves formed by transverse texturing.

(e) Broom Texture. The traffic surface of curbs, sidewalks, and other horizontal surfaces designated to receive a broom finish will generally be hand

finished in accordance with paragraph (b) of this article. Surface manipulation shall be limited to that required to produce a smooth, sealed surface meeting surface-smoothness requirements.

The texturing broom may be any readily obtainable, medium-stiff, bristled broom. Striations produced by brooming shall be closely spaced and shall not exceed 1/8 inch in depth. Direction of brooming shall be at right angles to the face of the curb or sidewalk. Brooming shall be timed to produce a uniform texture throughout.

(f) Surface Smoothness. The finished surface shall be in substantial conformity with the lines, grades, and cross sections shown on the plans or as established by the engineer. The finished surface shall not vary more than 1/8 inch from a 10-foot straightedge placed parallel to the centerline of the roadway. High spot variations shall be measured as one-half the distance between the end of the straightedge centered on the apex with the opposite end held in contact with the surface. Low spot variations shall be measured as the distance from the straightedge to the surface with the straightedge centered on the low point. Unacceptable surface variations shall be corrected by grinding off high spots and patching or filling low areas.

Subsequent surface-sealing treatment will not be required where grooved surface is left by use of diamond-faced saw-type cutters for grinding. On areas ground with conventional star-wheel-type cutters, surface sealing shall be done as follows: The surface may be sealed with two coats of boiled linseed oil protective coating as specified in Article 41.13, provided not more than 1/4 inch in depth is removed from any part of the ground area. All other areas having any portion where removal exceeds 1/4 inch in depth shall be sealed with an approved, concrete-colored, low-viscosity epoxy-resin adhesive. A nonskid texture shall be provided by texturing with a steel-tine broom or by the application of medium-coarse silica sand to the plastic epoxy surface.

Ground areas, including any build-up from sealing, shall meet surface variation requirements.

Page 312

41.04 (L) (6) Bridge Seats and Top of Walls.

Rescind the last sentence in this article and replace it with the following:

No shim shall be less than 1/4 inch thick.

Add the following as the last paragraph in this article:

When elastomeric bearing pads are used, beam seat treatment shall be as specified in Article 43.10 (E). When elastomeric bearing pads are used and shims are required, the shims shall be steel and shall be the same size as the sole plate except for thickness. The shims shall be placed between the sole plate and the elastomeric pad.

Page 313

41.04(N) Placing Anchor Bolts.

Rescind the fifth sentence and replace with the following:

All anchor bolts for shoe assemblies shall have sufficient projection above the plane of the substructure concrete to assure full anchor bolt nut engagement after the final placement of the shoe assemblies. Holes of the correct depth

shall be filled about two-thirds full of an approved, nonshrink or epoxy grout. The bolts shall then be forced down by applying a uniform, even pressure or light blows with a hammer (flogging and ramming will not be permitted) until the grout rises to the top of each hole and the anchor bolt nut rests firmly against the metal shoe or pedestal.

Rescind the seventh sentence and replace with the following:

The exact, final locations of the anchor bolts shall be determined by making appropriate allowance for thermal effects on the superstructure at the time of grouting.

Add the following as the first two sentences of the second paragraph:

Grouting of anchor bolts during freezing weather will not be permitted. However, a written proposal requesting the use of nonshrink or epoxy grout products formulated specifically for use at temperatures below freezing will be considered for approval.

Page 315

41.05 METHOD OF MEASUREMENT.

Rescind the first sentence in the fifth paragraph of this article and replace it with the following:

For timber piling designated as 12-inch diameter, the volume to be deducted will be 0.8 cubic feet per linear foot of piling encased in concrete. For timber piling designated as 14-inch diameter, the volume to be deducted will be 1.1 cubic feet per linear foot of piling encased in concrete.

Page 316

41.11 DESCRIPTION.

Rescind the first sentence in this article and replace it with the following:

41.11 DESCRIPTION. This item shall consist of furnishing a protective coating for bridge decks, the top surfaces of sidewalks, and the tops and inside vertical surfaces of curbs, end posts, and concrete barriers.

Page 320

42.04 MATERIALS.

Add the following as the first sentence of Part (A) Concrete:

(A) Concrete. Concrete for prestressed members shall meet the applicable requirements of Section 40 and the following:

Add the following to this article after part (E) on page 322:

(F) Elastomeric Bearing Devices. Elastomeric bearing pads shall be furnished and installed in accordance with the plans and specifications and shall conform to the lines, dimensions, design, and material composition as shown on the plans and as specified in Article M-290.19.

Page 331

42.05 (G)(3) Concreting During Adverse Weather Conditions.

Rescind the first paragraph of this article and replace it with the following:

(3) Concreting During Adverse Weather Conditions. Concrete operations carried on when the ambient air temperature falls below 40° F shall comply with the requirements of Articles 41.04 (I) (1) and (2), except that the placement temperature for steam-cured Class "Pre" concrete shall be at least 50° F and not more than 90° F at the time of placing.

Page 332

42.05 (H) Curing.

Rescind the next to the last paragraph in this article and replace it with the following:

No member shall be exposed to below-freezing temperatures until at least 6 days after casting, except as follows: Members may be steam-cured without interruption beyond the release strength requirements until the minimum required 28-day compression strengths are attained or exceeded. Transfer of prestress shall be performed as set forth in Article 42.05 (I), and the 6-day post-cure protection period will not be required. A gradual cooling of the member, as set forth in Article 42.05 (H), will be strictly enforced and shall be complied with.

Compression specimens for field determination of the 28-day strength shall be provided as set forth in Article 42.05 (I) for prestress transfer specimens. In addition, the normal set of three concrete test cylinders shall be made in accordance with the requirements of Article 40.06 (A).

Page 333

42.05 (I) Transfer of Prestress.

Rescind the fourth and fifth paragraphs of this article and replace them with the following:

Cylinders cast for determination of prestress transfer strength shall be cast by the contractor in accordance with MT-101, MT-111, and as modified herein. The release cylinders shall be cast and cured within the curing enclosure under the exact conditions and method used to cure the prestressed members. Upon completion of the cure cycle, the release cylinders shall be tested by the contractor in accordance with AASTHO T22. For determination of prestress transfer strength of each round of multiple beam castings, three cylinders shall be tested. The average strength of the three cylinders shall be equal to or greater than the required minimum prestress transfer strength, and each cylinder shall have a strength of at least 95 percent of the required transfer strength. All three cylinders shall be tested within a time period not to exceed 30 minutes.

Page 339

42.07 BASIS OF PAYMENT.

Add the following as the last sentence in the first paragraph of this article:

Payment for prestressed members shall also constitute full compensation for all materials, labor, equipment, tools, and incidentals necessary to furnish and install elastomeric bearing devices as shown on the plans.

Page 341

43.03 FABRICATION DRAWINGS.

Change the fourth sentence in this article to read: "All fabrication drawings shall be 24 x 36 inches...".

Page 343

43.06(B) Workmanship and Finish.

Add the following as the last paragraph of the article:

Plates and splice plates for flanges and webs shall be cut from stock so that the direction of rolling will be parallel to the longitudinal axis of the girder. Shop drawings shall show the direction of rolling for these plates.

43.06(C) Finishing and Shaping.

Add the following:

Girders shall be fabricated with the camber shown on the plans.

43.06 (C)(2) Facing of Bearing Surfaces.

Change the fourth line of this article to read: "...requirements as defined in ANSI B46.1, Surface Roughness, Waviness,...".

Add the following as the last paragraph of the article:

Shoes shall be stress-relieved after all welding is completed and before pinholes are drilled or curved bearing surfaces are finished.

Page 354

Add the following to Article 43.06:

(J) Field Welding. Welding for the attachment of temporary construction details, such as rails for deck finishing equipment, bar support, and deck forming devices to beams, girders, or other main members, will not be permitted. Unauthorized field welds on girder flanges will be grounds for rejection of the girder section.

Page 355

43.07 (B) Field Work.

Rescind this article in its entirety and replace it with the following:

(B) Field Work. The parts shall be accurately assembled as shown on the plans, and all matchmarks shall be followed. The material shall be handled carefully so that no parts will be bent, broken, or otherwise damaged. Hammering that could injure or distort the members shall not be done. Bearing surfaces and all surfaces to be in permanent contact shall be cleaned before the members are assembled.

Splices and field connections shall have one-half of the holes filled with bolts and cylindrical erection pins (half bolts and half pins) before temporary supports are removed or the load is released from erecting equipment. Splices and connections carrying traffic during erecting shall have three-fourths of the holes so filled.

Fitting-up bolts shall be of the same nominal diameter as the rivets, and cylindrical erection pins shall be 1/32 inch larger.

Unless erected by the cantilever method, truss spans shall be erected on blocking, so placed as to give the trusses proper camber. The blocking shall be left in place until the tension cord splices are fully riveted or bolted and all other truss connections pinned and bolted. Rivets or bolts in splices of butt joints of compression members and rivets or bolts in railings shall not be driven or tensioned until the span has been swung.

Page 356

43.10(A) General.

Rescind this article in its entirety and replace with the following:

(A) General. The contractor shall erect the metal work in accordance with the camber diagrams shown on the drawings, shall remove the temporary construction, and shall do all the work required to complete the structure or structures, as covered by the contract, all in accordance with the plans and specifications.

Girders and beams shall be supported at sufficient intervals throughout their entire length in order to maintain proper elevation and horizontal alignment during final grading, bolting, and tightening of field splices.

Page 357

43.10 (E) Bearing and Anchorage.

Add the following as the last sentence in the third paragraph of this article:

The canvas sheets shall be of such dimensions and so positioned that every sheet protrudes not less than ½ inch on all sides of the masonry bearing plate.

Page 363

44.02 MATERIALS.

In the list of referenced articles following the first paragraph:

Change the reference for Untreated Timber Piles to be "46.02 (A)" instead of "M-270.01".

Change the reference for Treated Timber Piles to be "46.02 (A)" instead of "M-270.02".

Change the reference for Structural Timber & Lumber to be "M-270.01" instead of "M-270.03".

Change the reference for Treated Timber to be "M-270.04" instead of "M-270.06".

Page 370

45.03 (C) Cofferdams.

Delete the third paragraph of this article and replace it with the following:

When weighted cribs are employed and the weight utilized to partly overcome the hydrostatic pressure acting against the bottom of the foundation seal, special anchorage, such as dowels or keys, shall be provided to transfer the entire weight of the crib into the foundation seal. When a foundation seal is placed, the cofferdam shall be vented or ported at the cofferdam design low-water level.

Cofferdams and foundation seals provided by the contractor shall be suitable to permit the safe and acceptable completion of the work. The depth of foundation seals shown on the plans are based on the estimated, normal water-surface elevations shown or are consistent with those satisfactorily employed on past projects.

The scheduling and prosecution of cofferdam installation and the placement of foundation seal concrete is the responsibility of the contractor. Therefore, he shall form his own judgement of water-surface elevations that will exist at the time of cofferdam construction and seal placement and its possible effects on cofferdam components and seal depth.

The seal thickness shown on the plans is considered a minimum. The contractor may request that the seal depth be increased. Such request shall be submitted for the review and prior approval of the engineer in regard to modifications to other portions of the substructure unit necessary to accommodate the modification. The increased seal depth shall be considered as a part of the cofferdam, and all costs thereof shall be included in the lump sum price bid for shoring and cribs.

The repair or replacement of either failed cofferdams or foundation seals or both shall be accomplished by the contractor to the complete satisfaction of and at no cost to the Department of Highways.

Upon completion of the cure period, as set forth in paragraph (D) below, the cofferdam shall be pumped out and the balance of the masonry or concrete shall be placed in the dry.

Page 372

45.05 (A) Structure Excavation Type I.

Add the following to this article:

The following percentages of the total quantity of Structure Excavation Type I, when removed, will be allowed for payment of progress estimates:

1. 85 percent when removed to plan elevation.
2. 95 percent when backfilled and compacted in compliance with the Standard Specifications and Special Provisions.
3. 100 percent when the area is cleaned up to the satisfaction of the engineer.

Page 390

47.05 PLACING AND FASTENING.

Add the following as the second sentence in the first paragraph of this article:

Care shall be taken in placing reinforcing steel to insure clearance of anchor bolt locations.

Add the following as the second paragraph in this article:

The minimum covering, measured from the surface of the concrete to the face of reinforcement bars, shall be 2 inches, except as follows or otherwise noted.

Top of Slab.....	2 3/8 inches
Bottom of Slab.....	1 inch
Stirrups and Ties.....	1 1/2 inches
Footing and Pier Shafts.....	3 inches

Rescind the first and second sentences of the third paragraph and replace with the following:

For deck slabs, the upper and lower mats of reinforcing steel, depending upon the vertical distance between them, shall be separated by metal chairs of the "Upper Continuous High Chair (U.C.H.C.)" or "Slab Bolsters with Runners (S.B.R.)" designation. In bridge construction, the continuous bar supports shall be placed at right angles to centerline of structure for "Flat Slab" structures and parallel to centerline of structure for all other deck slab construction.

Add the following after the third paragraph of this article:

Spacing between deck slab reinforcement supports shall not exceed 4 feet. Supports shall be spaced closer if necessary to prevent excessive deflection under loads imposed by crews and equipment during concrete placement.

Page 392

47.08 METHOD OF MEASUREMENT.

Add the following as the last paragraph of this article:

Clips, wire, separators, or other material used for fastening or supporting the reinforcing steel will not be measured for payment.

47.09 BASIS OF PAYMENT.

Rescind the first paragraph and replace with the following:

47.09 BASIS OF PAYMENT. The weight of reinforcing steel, determined as provided above, shall be paid for at the contract unit price per pound for reinforcing steel complete in place, which price shall be full compensation for the work, including the installation of clips, wire, separators, and other material used for fastening or supporting the reinforcing steel in place.

Page 401

50.15 METHOD OF MEASUREMENT.

Add the following as the last sentence in this article:

Excavation for placement of riprap will not be measured for payment.

50.16 BASIS OF PAYMENT.

Rescind this article in its entirety and replace it with the following:

50.16 BASIS OF PAYMENT. The accepted quantities, determined as provided above,

will be paid for at the contract unit price, which price and payment shall be full compensation for the work, including all required excavation.

Page 403

50.24 METHOD OF MEASUREMENT.

Add the following as the last sentence in this article:

Excavation for placement of rubble masonry will not be measured for payment.

50.25 BASIS OF PAYMENT.

Rescind this article in its entirety and replace it with the following:

50.25 BASIS OF PAYMENT. Rubble masonry will be paid for at the contract unit price per cubic yard, which price and payment shall be full compensation for the work, including all required excavation.

Page 404

50.34 METHOD OF MEASUREMENT.

Rescind the last sentence in this article and replace it with the following:

Excavation for placement of bank protection will not be measured for payment.

50.35 BASIS OF PAYMENT.

Rescind the last sentence in this article and replace it with the following:

Excavation for placement of bank protection will not be paid for directly but will be considered incidental to and absorbed in payment for bank protection.

Page 406

50.45 METHOD OF MEASUREMENT.

Rescind the last sentence in this article and replace it with the following:

Sand-gravel cushion will be measured by the cubic yard, compacted in place in the completed and accepted work.

Page 407

51.03 (A) Foundations.

Rescind this article in its entirety and replace it with the following:

(A) Foundations. Excavation and foundation preparation for concrete retaining walls shall meet the requirements of Article 45.03. Foundations for metal bin-type retaining walls shall provide firm, level support for the base of the bins and shall conform to the established lines and grades. All foundations shall be inspected and approved prior to placement of the structure.

51.04 (C) Excavation will be measured...

Rescind this article in its entirety and replace it with the following:

(C) Excavation for placement of retaining walls will not be measured for payment.

51.05 BASIS OF PAYMENT.

Rescind this article in its entirety and replace it with the following:

51.05 BASIS OF PAYMENT.

(A) Concrete will be paid for in accordance with Section 41. The contract unit price and payment shall be full compensation for the concrete and all necessary excavation, foundation preparation, backfilling, materials, and incidentals necessary to complete the item but will not constitute payment for reinforcing steel.

(B) Reinforcing steel will be paid for in accordance with Article 47.09.

(C) Metal bin-type retaining walls will be paid for at the contract unit price per nominal square foot of facial area as bid, which price and payment shall be full compensation for the work, including all required excavation, foundation preparation, and backfilling.

SECTION 52 - EXCAVATION FOR CULVERTS AND MINOR STRUCTURES.

Rescind Section 52 in its entirety and replace it with the following:

SECTION 52
CULVERT EXCAVATION AND TRENCH EXCAVATION

52.01 DESCRIPTION. This work shall consist of excavation for placement or removal of culverts, sewers, drains, pipes, tubing, or other installations as shown on the plans and shall include foundation preparation, backfilling, and disposal of material obtained from such excavation as required. It shall also include all necessary bailing, drainage, sheeting, and the construction of shoring and cribbing as necessary.

The contract will specify the particular type of excavation involved in the project. When excavation necessary for placement or removal of any culvert, sewer, drain, pipe, or tubing is not specified in the contract, the type of excavation shall be as specified by the engineer.

52.02 CLASSIFICATION.

(A) Culvert Excavation. Culvert excavation shall be all work as described in Article 52.01, where the sides of the excavation are not required to be vertical and the width of the excavation will be as required by the contractor's operation in keeping with the requirements of this specification.

(B) Type 1 Trench Excavation. Type 1 trench excavation shall be trench excavation for placement or removal of storm sewers, sanitary sewers, water

lines, and other installations as indicated on the plans, where vertical trench walls are not required.

(C) Type 2 Trench Excavation. Type 2 trench excavation shall be all work as described in Articles 52.01 and 52.02 (B), where the sides of the excavation shall be approximately vertical and the maximum trench width shall be as specified. The sides of the excavation shall be shored or otherwise supported when the excavation is more than 5 feet deep.

52.03 CONSTRUCTION REQUIREMENTS.

(A) General. The excavation lines and elevations shown on the plans shall be considered as approximate only, and no additional compensation will be allowed for any change thereto except as provided for in Article 09.03. All excavations shall be sufficiently wide to permit proper jointing of pipe and backfilling.

All excavations shall conform to the requirements of the U.S. Department of Labor, Occupational Safety and Health Administration, Safety and Health Regulations for Construction.

The contractor shall exercise sound construction practices in excavating and maintaining excavations so that no injury to any person nor damage to any foundation, structure, pole line, or other facility will occur as a result of the excavation. If, as a result of the excavation, there is a disturbance of the ground such as to endanger persons or property, the contractor shall immediately take remedial action at no cost to the Department.

All excavated material piled adjacent to the excavation or in a roadway or public thoroughfare shall be piled and maintained so that the toe of the slope of the pile is at least 2 feet from the edge of the excavation. It shall be piled so that it will cause a minimum of inconvenience to public travel. Access shall be provided to all fire hydrants, water valves, and meters, and clearance shall be left to enable free flow of storm water in all gutters, other conduits, and natural water courses.

The walls and faces of all excavations in which employees are exposed to danger from moving ground shall be guarded by a shoring system, sloping of the ground, or some other equivalent means consistent with the type of excavation.

Care shall be taken not to excavate below the depth indicated, and excavation below that depth shall be in accordance with Article 52.03 (G).

Boulders, logs, or any unforeseen obstacles encountered in excavating shall be removed, and no additional compensation will be allowed because of difficulties encountered in removing such obstructions.

Backfilling of excavated areas shall be done in accordance with Article 54.05. No backfill shall be placed against newly constructed masonry or concrete structures for a period of 14 days unless authorized by the engineer. All sheeting and bracing shall be removed as the excavation is backfilled unless otherwise indicated on the plans or directed by the engineer.

(B) Culvert Excavation. Culvert excavation shall meet the requirements of Article 52.03 (A) and the following: The sides of culvert excavation more than 5 feet deep shall be either sloped or supported to preclude collapse. When special foundation stabilization is required, the walls of the bedding trench shall be vertical, regardless of any sloping of the walls of the culvert excavation, and the trench width shall be as directed to accommodate the bedding material.

(C) Type 1 Trench Excavation. Type 1 trench excavation shall meet the requirements for culvert excavation in Article 52.03 (B) and the following:

Whenever a trench is excavated in a paved roadway, sidewalk, or other improved area, the maximum allowable length of open trench will be 450 feet. The length of trench excavated in advance of pipe laying shall be kept to a minimum, and in no case shall it exceed 200 feet unless specifically authorized by the engineer. All backfilling and compaction shall be completed within a maximum distance of 300 feet behind the newly installed pipe.

(D) Type 2 Trench Excavation. Type 2 trench excavation shall meet the requirements of Article 52.03 (A), 52.03 (C), and the following: The maximum trench width shall be the external width of the pipe barrel plus 3 feet. When special foundation stabilization is required, the maximum trench width shall be modified as directed to accommodate the bedding material. Trench widths for multiple installations shall be as indicated in the special provisions or shown on the plans or Standard Drawings. Where trench excavation is for other than placement or removal of culverts, sewers, drains, pipes, or tubing, the trench width shall be as shown on the plans or as stated in the special provisions or in Article 52.03 (E). The Contractor shall not exceed the maximum trench width without the approval of the engineer. If the contractor exceeds the maximum trench width, he will be required to furnish any additional, select backfill material or any additional surface and subsurface improvements at no cost to the Department.

(E) Excavation for Appurtenant Structures. Excavation for riprap, rubble masonry, retaining walls, cutoff walls, headwalls, manholes, drop inlets, catch basins, headgates, division boxes, and similar structures appurtenant to culverts, sewers, drains, pipes, or tubing shall meet the requirements of Article 52.03 (A).

(F) Shoring. The contractor shall provide all materials, labor, and equipment necessary to adequately shore or otherwise support the walls of excavations to protect the work, existing property, utilities, pavement, and other existing facilities and to provide safe working conditions in the trench. The contractor may use sliding trench shields or other methods of accomplishing the work, provided the methods meet the requirements of all applicable local, state, and federal safety codes.

Removal of any shoring, bracing, sheeting, or other support from any excavation shall be accomplished in such a manner as to fulfill the above requirements. When the removal of any support will result in danger to workmen or damage to the work or any surrounding property, the support shall be left in place.

Damage resulting from improperly supporting the sides of excavations or from failure to provide such support shall be the sole responsibility of the contractor.

(G) Foundation Preparation. Foundations for all culverts, sewers, drains, pipes, tubing, and appurtenant structures shall conform to the lines and grades established by the engineer.

The moisture and density of foundations for culverts, sewers, drains, pipes, tubing, and appurtenant structures shall meet the requirements of Article 11.05, unless otherwise directed.

Unstable or unsuitable foundation material below the required elevation of the excavation floor shall be removed as directed. All unsuitable material shall be disposed of to the satisfaction of the engineer. Hardpan or other unyielding material shall be removed as directed below the staked elevation for a minimum depth of 12 inches. The unsuitable material or hardpan shall be replaced as shown in the Standard Drawings with bedding material meeting the requirements of

Article M-100.11.

Bedding for culverts shall meet the requirements of the Standard Drawings, with the exception of culverts 12 inches in diameter and smaller. Bedding for culverts 12 inches in diameter and smaller shall support the culvert uniformly throughout its length but need not be shaped to conform to the outside of the culvert.

No pipe shall be laid until the foundation has been approved. Any pipe laid without prior approval of the foundation shall be removed and relaid properly at no additional cost to the Department.

The foundation for reinforced concrete pipe shall be Class C unless specified otherwise.

52.04 METHOD OF MEASUREMENT. All acceptable culvert excavation or trench excavation will be measured by the cubic yard in its original position in accordance with Article 09.01.

When trench excavation or culvert excavation is 5 feet deep or less, the quantity of trench excavation or culvert excavation to be measured for payment will be the volume bounded on the bottom by the elevations established for the excavation floor and bounded on the sides and ends by vertical planes 12 inches outside the neat lines of the pipe or culvert, unless otherwise set forth in the plans or special provisions.

For culvert excavation and Type 1 trench excavation more than 5 feet deep, the quantity of excavation to be measured for payment will be the volume bounded on the bottom by the elevations established for the excavation floor, bounded on the ends by vertical planes 12 inches outside the ends of the pipe or culvert, and bounded on the sides as follows: By vertical planes 12 inches outside the neat lines of the pipe or culvert from the excavation floor to 5 feet above the excavation floor, and from the top of the vertical planes thus described to the upper limits of the culvert or trench excavation by planes sloped outward on a 1:1 ratio.

For Type 2 trench excavation, the quantity of excavation to be measured for payment will be the volume bounded on the bottom by the elevations established for the excavation floor, bounded on the ends by vertical planes 12 inches outside the ends of the culverts, sewers, drains, pipes, tubing, or other installations as shown on the plans, and bounded on the sides by vertical planes 18 inches outside the neat lines of the culverts, sewers, drains, pipes, tubing, or other installations as shown on the plans.

For culverts, sewers, drains, pipes, tubing, or other installations as shown on the plans entering structures, neither culvert excavation nor trench excavation will be measured for payment within the neat lines of structures so entered.

When special foundation stabilization is required, the distance between vertical planes bounding the sides of the volume to be measured for payment shall equal the required width of the bedding trench.

In cut sections, neither culvert excavation nor trench excavation will be measured for payment above the lines of the planned or staked template section whether it be roadway template, channel change template, or otherwise. However, when the engineer requires culvert excavation or trench excavation prior to excavation for the template section, such culvert excavation or trench excavation will be measured to the existing ground surface.

In fill sections, neither culvert excavation nor trench excavation will be measured for payment above the natural ground line as cross sectioned, unless otherwise indicated on the plans or special provisions or directed by the engineer.

Shoring for culvert excavation or trench excavation will not be measured for payment. However, sheeting materials ordered to be left in place shall be measured for payment as specified in Article 52.05.

Measurement of excavation for flared end terminal sections or special end sections will be based on regular barrel dimensions extended through these sections. No additional excavation will be allowed for special or flared end terminal sections.

Excavation and foundation preparation for appurtenant structures will not be measured for payment.

Bedding material will be measured as specified in Article 54.06.

52.05 BASIS OF PAYMENT. Accepted quantities of culvert excavation and trench excavation Type 1 or Type 2 will be paid for at the contract unit price per cubic yard. The unit price per cubic yard shall be payment for excavation, foundation preparation, placing and compacting backfill, and disposal of all surplus or unsuitable material, unless otherwise specified. The unit price per cubic yard shall also be payment for all costs incurred or associated with all necessary bailing, drainage, sheeting, shoring, cribbing, and providing exit means from the excavated area.

The contractor will be paid his cost of sheeting materials ordered to be left in place. The cost of these materials shall be evidenced by material and freight bills. No additional allowance will be made for installation, handling, or drayage by the contractor's forces nor for overhead, insurance, profit, or any other costs.

Payment for excavation and foundation preparation for appurtenant structures will be absorbed in payment for the respective structural items.

Bedding material will be paid for as specified in Article 54.07.

Page 415

54.03 (C) The foundation shall...

Change this article to read, "The foundation shall be prepared in accordance with Article 52.03 (G)."

Page 418

54.04 (D) Pipe Underdrains.

Change the last line in this article to read, "...preparation under Article 52.03 (G)."

Page 439

73.05 CONSTRUCTION METHODS.

Change the first sentence in the last paragraph of this article to read, "Excavation shall meet the requirements of Article 45.03, insofar as applicable or as directed."

Page 440

73.06 METHOD OF MEASUREMENT.

Add the following as Article 73.06 (E):

(E) Excavation and foundation preparation for irrigation facilities and headwalls will not be measured for payment.

73.07 BASIS OF PAYMENT.

Add the following as the last paragraph in this article:

Excavation and foundation preparation for irrigation facilities and head-walls will not be paid for directly but will be considered incidental to and absorbed in other items constituting payment for facilities.

Page 445

75.03 (A) General.

Rescind the first paragraph of this article and replace it with the following:

(A) General. Curbs, island curbs, and median curbs shall be painted in accordance with the requirements of Article 89.04, as applicable.

Delete the last sentence in the third paragraph of this article and replace it with the following:

Foundations for cast-in-place curb and curb and gutter shall be excavated or otherwise prepared to provide a firm, even surface and shall meet the moisture and density requirements specified in Article 11.05

Page 447

75.04 METHOD OF MEASUREMENT.

Add the following as the last two paragraphs in this article:

Excavation and foundation preparation for placement of curb and gutter will not be measured for payment.

Paint and painting will be measured in accordance with Article 89.06.

75.05 BASIS OF PAYMENT.

Rescind the second paragraph of this article and replace it with the following:

The cost of paint and painting will be paid for at the contract unit price per gallon in accordance with Article 89.07.

Add the following as the last sentence in this article:

Excavation and foundation preparation for placement of curb and gutter will not be paid for separately but will be considered incidental to and absorbed in payment for curb and gutter.

Page 455

80.03 (A) Posts.

Rescind the second paragraph of this article in its entirety and replace it with the following:

All posts on 5- and 6-foot fence shall be set in concrete. End, corner, and pull posts on 3- and 4-foot fence and line posts connected by bracing to end, corner, or pull posts shall be set in concrete. Line posts on 3- and 4-foot fence shall be driven or set in concrete as field conditions warrant. Concrete

for post footings shall be Class "F". Footing dimensions shall be as shown on the Standard Drawings. All concrete footings shall be crowned to shed water.

In the sixth paragraph, change the second sentence to read, "Concrete footings shall be constructed from the solid rock to the top of the ground on 5- and 6-foot fence and on end, corner, and pull posts for 3- and 4-foot fence."

Page 456

80.03 (B) Top Rail - 6 Foot Fence.

Change the title of this article to be "(B) Top Rail."

80.03 (C) Top Tension Cable - 3, 4, and 5 Foot Fence.

Delete this article in its entirety.

Page 457

80.03 (D) Fence Fabric.

Change the last sentence in the third paragraph of this article to read, "The top edge of the fabric shall be fastened to the top rail with tie wires spaced at 18-inch intervals."

Page 461

81.03 CONSTRUCTION METHODS.

Rescind the fourth paragraph of this article and replace it with the following:

The preservative shall be a minimum 5 percent by weight pentachlorophenol solution or Chromated Copper Arsenate (CCA), Type B or C, or Ammoniacal Copper Arsenate (ACA) conforming to AWPA standards.

Page 465

81.06 (C) Wooden and metal panels...

Add the following sentence to this article:

Panels required for move and reset fence will not be measured for payment but will be considered incidental to and absorbed in other items of the contract.

81.07 (F) Move and reset fence...

Rescind this article in its entirety and replace it with the following:

(F) Move and reset fence will be paid for at the contract unit price per linear rod. Payment for move and reset fence shall be full compensation for furnishing equipment and doing all work required to move and reset fence. Panels required for move and reset fence will not be paid for directly but will be considered incidental to and absorbed in payment for other items of the contract.

Page 470

82.04 BASIS OF PAYMENT.

Rescind this article in its entirety and replace it with the following:

82.04 BASIS OF PAYMENT. The contract unit price for each cattle guard, complete in place, shall be full compensation for the work.

Page 489

88.05 METHOD OF MEASUREMENT.

Rescind paragraphs (A) through (F) and replace with the following:

(A) Aluminum and Plywood Signs. Aluminum sheet, aluminum sheet increment, and plywood signs will be measured by the square foot. Measurement will be to the nearest 0.1 square foot of sign face for each sign accepted, complete in place.

(B) Metal Posts. Metal posts will be measured by the pound. The pay weight will be calculated by multiplying the nominal weight per foot by the installed length of each post plus the weight of the break-away device, fuse plate, and stub post or foundation embedment for each post accepted, complete in place.

(C) Treated Timber Poles and Posts. Treated timber poles and posts will be measured by the foot in even two-foot increments for each pole or post accepted, complete in place. When the measurement of an installed pole or post falls between increments, the measurement for payment will be the next higher two-foot increment.

(D) Lump Sum. When a signing system is specified in the contract on a lump sum basis, there will be no direct measurement.

Reletter paragraph "G" to be "E".

88.06 BASIS OF PAYMENT.

Rescind this article in its entirety and replace with the following:

88.06 BASIS OF PAYMENT.

(A) Aluminum and Plywood Signs. Aluminum sheet, aluminum sheet increment, and plywood signs will be paid for at the contract unit price per square foot.

(B) Metal Posts. Metal posts will be paid for at the contract unit price per pound.

(C) Treated Timber Poles and Posts. Treated timber poles and posts will be paid for at the contract unit price per linear foot.

(D) Lump Sum. When specified in the contract on a lump sum basis, the signing system will be paid for at the contract lump sum price.

(E) Delineators.

(1) Delineator reflectors will be paid for at the contract unit price per each.

(2) Delineator posts (metal U-posts) will be paid for at the contract unit price per linear foot.

Payment for the various items specified above shall be full compensation for furnishing all labor, materials, tools, and equipment incidental to or necessary for the construction of the complete signing system shown on the plans or modified by the engineer, including excavation and backfill, portland cement and concrete for foundations, all miscellaneous hardware, equipment use, welding, back bracing, post clips, and all other incidentals that may be required.

Page 491

89.02 MATERIALS.

Rescind this article in its entirety and replace it with the following:

89.02 MATERIALS. Paint and glass beads shall meet the requirements of Section M-280.

Plastic pavement marking materials shall meet the requirements of Article M-320.03 and the following:

A 4-inch by 1-foot sample from each lot of plastic material proposed for use on the project shall be submitted to the Materials Bureau for approval. No plastic pavement marking material shall be applied on any project that has not been approved for application on that project.

Plastic pavement markings and legends shall consist of reflectorized, pre-fabricated, homogeneous, thermoplastic ribbon of specified thickness. The plastic material shall contain reflective glass spheres uniformly distributed throughout its entire cross section and shall be capable of being affixed to bituminous or portland cement concrete pavements by means of a liquid contact cement or precoated, pressure-sensitive adhesive. The plastic material shall be white or yellow conforming to standard highway colors. Throughout the expected life of the pavement marking, white plastic material shall be nonyellowing and yellow plastic material shall be nonfading.

For specified stripe of line widths 6 inches or less, plastic pavement striping material shall be supplied in a single manufactured width equal to the specified width. For specified stripe of line widths greater than 6 inches, plastic pavement striping material shall be supplied in a single manufactured width equal to the specified width or shall be supplied in two or more widths totaling the specified width.

The edges of all plastic pavement marking material shall be cut clean and true. Plastic material to be inlaid into new asphaltic surfaces shall be not less than 0.09 inches thick. Plastic material to be applied to existing surfaces or to hardened, new surfaces shall be 0.06 inches thick.

Plastic pavement markings to be inlaid into new asphaltic surfaces shall be capable of being applied immediately prior to the final rolling of the new surface and of being rolled into place with conventional pavement and highway rollers. For inlay applications, the plastic and adhesive shall be of a type that pavement temperatures over 150° F or water used on rollers to prevent asphalt pickup shall not be harmful to successful application of the plastic.

Plastic pavement marking material and its adhesive shall be sufficiently free of tack so that it can be easily handled without a protective backing and can be repositioned on the surface to which it is to be applied before being permanently fixed in position with a downward pressure. Precoated adhesive, when used, shall be uniformly distributed to the entire contact surface of the plastic material.

The plastic pavement marking material shall mold itself to pavement contours, breaks, faults, and the like, by traffic action at normal pavement temperatures. The plastic material shall have resealing characteristics such that it

will fuse with itself and with previously applied markings of the same composition under normal conditions of use.

Pavement legends and symbols must conform to the applicable shapes and sizes prescribed by the "Manual on Uniform Traffic Control Devices" as adopted by the FHWA.

Agents or distributors of products shall provide manufacturer's specifications showing that the material furnished meets or exceeds the requirements specified herein and shall submit evidence of successful product use over a one-year period under similar climatic conditions. Plastic pavement marking material not meeting the successful-use requirement will not be acceptable.

Page 492

89.03 CONSTRUCTION METHODS.

Rescind this article, including the title, in its entirety and replace it with the following:

89.03 APPLICATION OF PLASTIC PAVEMENT MARKING MATERIAL. Plastic pavement marking materials shall be applied only to clean, dry surfaces free of paint, dirt, and foreign matter. On newly constructed surfaces to which a sealer has been applied, the surface to receive the plastic pavement marking must be precleaned to neutralize any acid and remove the sealer.

Application shall be according to manufacturer's recommended procedures. Plastic pavement marking materials shall only be applied to surfaces at temperatures within the range specified by the manufacturer for optimum adhesion.

When activators are required for the adhesive or when various special coatings are required for different pavement surfaces, detailed information must be supplied to the engineer, indicating special application procedures.

The width and layout of stripes or the area of application of plastic pavement markings and legends shall conform to dimensions shown on the plans or standard drawings.

Prior to application of plastic striping material, the engineer will establish control points on the roadway for striping alignment. The engineer will establish such control points at least every 500 feet on tangent, at least every 100 feet on curves of 2 degrees or less, and at 50-foot intervals for curves over 2 degrees. The engineer will also designate other pavement striping locations such as stop bars, crosswalks, and the like. The contractor shall maintain all lines within 2 inches of established lines. The engineer will use the Montana Department of Highways Manual for Pavement Markings to lay out the work for the contractor.

Plastic pavement marking materials to be inlaid into new asphaltic surfaces shall be properly placed on the roadway just before final compaction and rolled into the new surface during final compaction. The end result shall be pavement markings or legends that are essentially flush with the finished surface.

Page 493

89.04 PAINTING TRAFFIC LINES.

Rescind the second paragraph of this article and replace it with the following:

The top and traffic side of curbs shall be painted at those locations where parking is to be restricted, as shown on the plans. The top and traffic sides of all island curbs, median curb, and other curb serving a similar purpose shall be

painted. The painting shall consist of uniformly applying one coat of yellow traffic line paint meeting the requirements of Section M-280, as applicable. The curb shall not be painted until allowed to cure at least 30 days after being cast. The paint shall be applied at such a rate that the curb surface is completely covered and hidden. Surfaces to be painted shall be clean and free of all foreign matter prior to painting.

Change the last sentence in the fifth paragraph of this article to read as follows:

For centerline painting, the machine shall be equipped with an automatic skip control giving the specified broken-line pattern within a linear tolerance of 6 inches over each cycle.

Rescind the second line on the top of Page 495 and replace it with the following:

Four-inch dashed stripe (9-ft stripe - 15-ft gap) - at least 665 but not more than 735 linear ft.

Four-inch dashed stripe (10-ft stripe - 30-ft gap) - at least 1000 but not more than 1100 linear ft.

Page 495

89.06 METHOD OF MEASUREMENT.

Rescind this article in its entirety and replace it with the following:

89.06 METHOD OF MEASUREMENT. Plastic pavement striping will be measured for payment by the number of linear feet of line of the specified width in place and accepted. Length of dashed, longitudinal pavement line shall be the actual length placed, e.g., 25 percent of the total roadway length where 10-30 line-gap ratio is used.

Plastic pavement marking words and symbols will be measured for payment by the number of square feet of words and symbols in place and accepted.

Painted traffic lines, words, and symbols will be measured for payment by the number of gallons of paint used and accepted.

Work required for removal of pavement markings will not be measured for payment.

Paint and painting of curbs, island curbs, and median curbs in accordance with Article 89.04 will be measured by the actual gallons of paint used and accepted.

BASIS OF PAYMENT.

Rescind the first paragraph of this article and replace it with the following:

89.07 BASIS OF PAYMENT. Plastic pavement striping will be paid for at the contract unit price per linear foot of striping of the specified width.

Plastic pavement marking words and symbols will be paid for at the contract unit price per square foot of plastic words and symbols. Payment for plastic lines, words, and symbols will be full compensation for furnishing all necessary materials and equipment and doing all required work.

Rescind the fourth paragraph of this article and replace it with the following:

The cost of paint and the painting of curbs, island curbs, and median curbs in accordance with Article 89.04 will be paid for at the contract unit price per gallon for curb marking.

Page 515

M-100.01 A. 1. (a) Fine aggregate shall...

Rescind the first sentence of this article and replace it with the following:

(a) Fine aggregate shall consist of natural sand having hard, strong, durable particles conforming to the gradation requirements in Article M-100.01 A. 6.

M-100.01 A. 2. (a) The quality of...

Rescind this article in its entirety and replace it with the following:

(a) The quantity of deleterious substances shall not exceed the following limits:

	Maximum % by Wt.
Coal and Lightweight pieces	1.00
Clay Lumps	1.00

Page 517

M-100.01 B. 2. (a) The quantity of...

Rescind this article in its entirety and replace it with the following:

(a) The quantity of deleterious substances shall not exceed the following limits:

	Maximum % by Wt.
Coal and Lignite	1.00
Clay Lumps	0.25
Soft Fragments	5.00
Thin or elongated pieces having a length greater than five times average thickness	15.00
Material passing the No. 200 sieve	1.00

In the case of crushed aggregates, if the material finer than the No. 200 sieve consists of the dust of fracture essentially free from clay or shale, the maximum limit may be increased to 1.5 percent.

Page 518

M-100.01 B. 6. Grading

Rescind this article in its entirety.

M-100.01 B. 6. (a) Separation of material...

Rescind this article in its entirety and replace it with the following:

(a) One and one-half-inch aggregate shall conform to the gradation requirements tabulated below in paragraph (b) for No. 4 to 1½-inch size material and shall be furnished in two separate sizes conforming respectively to the gradation tabulated for No. 4 to ¾-inch size material and ¾- to 1½-inch size material.

Three-quarter-inch aggregate shall conform to the gradation requirements tabulated below in paragraph (b) for No. 4 to ¾-inch size material.

M-100.01 B. 6. (b) Coarse aggregate shall...

In the last line of the gradation table in this article change the designated size to be ¾" to 1½".

Page 519

M-100.02 AGGREGATE FOR SURFACING.

Add the following paragraph preceding the last paragraph in the article:

The use of scoria (fired clay commonly found in conjunction with burned coal in the lignite fields of the State) shall not be used as aggregate to be bituminized. Numerous sources of scoria are especially common but not limited to the counties of Daniels, Sheridan, Roosevelt, McCone, Dawson, Prairie, Wibaux, Custer, Fallon, Rosebud, Treasure, Bighorn, Powder River, and Carter.

M-100.03 SELECTED SURFACING.

In the second sentence of the second paragraph, change the word "amount" to "limit". The sentence should read, "The liquid limit for the material...".

Page 521

M-100.5 CRUSHED BASE COURSE TYPE "A".

Renumber this article to be "M-100.05".

Rescind paragraph (C) and replace with the following:

(C) The aggregate material shall have a wear factor not to exceed 50 percent at 500 revolutions, as determined by MT-209.

Page 522

M-100.06 CRUSHED BASE COURSE TYPE "B".

Rescind paragraph (A) and replace with the following:

(A) The aggregate material shall have a wear factor not to exceed 50 percent at 500 revolutions, as determined by MT-209.

Page 523

M-100.08 CRUSHED TOP SURFACING TYPE "B".

In the TABLE OF GRADATIONS under Grade 3, change the percent passing the No. 10 sieve to be "25-60%" instead of "26-60%".

Page 550

M-170.02 CORRUGATED STEEL PIPE AND PIPE ARCHES.

Rescind the first sentence of the second paragraph.

Page 552

M-170.03(E)(3) Flow Test.

In the fourth line of the article change "320° F. - 330° F." to be "150° F".

Page 555

M-210.01 CHAIN LINK FENCE.

Rescind this article in its entirety and replace it with the following:

M-210.01 CHAIN LINK FENCE.

(A) General. All material used in the construction shall meet the requirements of AASHTO M181, except as otherwise specified. The fence fabric shall be Type 1 Zinc-Coated Steel, Type 2 Aluminum-Coated Steel, Type 3 Aluminum Alloy, or Type 4 Vinyl-Coated Fabric, as set forth in the contract. Zinc coating for Type 1 fabric shall be Class A.

Posts, rails, gate frames, expansion sleeves, wire ties, fabric ties, hog rings, tension wire, miscellaneous fittings, and hardware furnished for use in conjunction with Type 1 or Type 2 fabric shall be zinc-coated steel; those furnished for use in conjunction with Type 3 fabric shall be of aluminum alloy; and those furnished for use in conjunction with Type 4 fabric may be either zinc-coated steel or aluminum alloy.

(B) Fence Fabric. The chain link fence fabric shall be made from wire helically wound and interwoven to form a continuous mesh with approximately uniform, 2-inch square openings having parallel sides and horizontal and vertical diagonals. Fabric 48 inches high and under shall be woven from 11-gage wire. Fabric 60 inches high and over shall be woven from 9-gage wire.

The height of the fabric shall be as specified or shown on current standard drawings. Fabric 48 inches high and under shall be knuckled at one selvage and twisted and barbed at the other. Fabric 60 inches high and over shall be twisted and barbed at both selvages.

(C) Posts, Rails, and Braces. Minimum sizes and weights of posts, rails, and braces shall be as shown in the TABLE OF FENCE SUPPORTS & FRAMING below. Length of posts shall be as shown on standard drawings. All posts shall be fitted with an approved top designed to fit securely over the post and carry the top rail. The post top shall fit over the outside of posts and shall exclude moisture from tubular posts.

(D) Truss Rods. Steel truss rods shall be galvanized, 3/8-inch diameter rods with drop-forged turnbuckles or other approved type of adjustment.

Aluminum truss rods shall be 3/8-inch diameter rods with cast-aluminum turnbuckles or other approved type of adjustment.

(E) Fabric Bands and Stretcher Bars. Steel fabric bands shall be not less than 1/8 inch thick by 3/4 inch wide. Aluminum fabric bands shall be not less than 1/8 inch thick by 7/8 inch wide.

Stretcher bars, aluminum or steel, shall be not less than 1/4 inch thick by 3/4 inch wide and shall not be shorter than 2 inches less than the full height of the fabric with which they are being used.

(F) Tie Wire. Steel tie wire shall be 9-gage galvanized wire meeting the requirements of ASTM A 116. Steel hog ring fasteners shall be 11-gage galvanized wire meeting the requirements of ASTM A 116. Galvanizing shall be Class 1.

Aluminum tie wire shall be 9-gage wire meeting the requirements of ASTM B 211, Alloy 1100, Temper H14. Aluminum hog ring fasteners shall be not less than 11-gage wire meeting the requirements of ASTM B 211, Alloy 6061.

(G) Tension Wire. Steel tension wire shall be 7-gage galvanized coiled spring tension wire. Galvanizing shall be Class 1 meeting the requirements of ASTM A 116.

Aluminum tension wire shall be 6-gage wire meeting the requirements of ASTM B 211, Alloy 6061, Temper T 94.

(H) Gates. Gates shall be furnished complete with necessary hinges, latch, and drop-bar locking device designed for the type of gate and gate posts used on the project. All welding for the assembly of gate frames shall meet the requirements of the AASHTO Specifications, the American Welding Society Specifications, and the plans and special provisions.

(1) Steel Gates. Gate frames shall be constructed from steel sections of the shapes and sizes shown in the TABLE OF FENCE SUPPORTS & FRAMING. The corners of the gate frame shall be fastened together and reinforced with galvanized malleable-iron fittings designed for the purpose, or they may be welded.

Chain link fabric for filling the gate frame shall meet the requirements of Article M-210.01 (B) and shall be the same type as used in the fence construction.

(2) Aluminum Gates. Gate frames shall be constructed from aluminum sections of the shapes and sizes shown in the TABLE OF FENCE SUPPORTS & FRAMING. Aluminum gate frames shall be assembled by welding.

Hinges shall be aluminum alloy castings meeting the requirements of ASTM B 108 or B 26 or made of malleable iron or steel and hot-dip galvanized. All latches, stops, and keepers shall be made of aluminum alloys as specified for hinges or galvanized, malleable iron or pressed steel.

Chain link fabric for filling the gate frame shall meet the requirements of Article M-210.01(B) and shall be the same type as used in the fence construction.

TABLE OF FENCE SUPPORTS & FRAMING

USE	STEEL - SHAPE, SIZE, WEIGHT	ALUMINUM - SHAPE, SIZE, WEIGHT
Line Post	1.90" O.D. Pipe @ 2.72 lb/ft 1.875" x 1.625" x 0.113" H- Section @ 2.70 lb/ft	2.375" O.D. Pipe @ 1.25 lb/ft 2.25" x 1.95" H-Section @ 1.25 lb/ft
End, Corner, & Pull Posts	2.375" O.D. Pipe @ 3.65 lb/ft 2.0" x 2.0" Sq. Tubing @ 3.6 lb/ft	2.875" O.D. Pipe @ 2.0 lb/ft 3.0" x 3.0" Sq. Tubing @ 2.0 lb/ft
Gate Post Gate Leaf Width 6 ft and Less Over 6 ft thru 13 ft Over 13 ft thru 18 ft	2.875" O.D. Pipe @ 5.79 lb/ft 2.5" x 2.5" Sq. Tubing @ 5.7 lb/ft 4.0" O.D. Pipe @ 9.10 lb/ft 3.0" x 3.0" Sq. Tubing @ 9.10 lb/ft 6.625" O.D. Pipe @ 18.97 lb/ft	2.875" O.D. Pipe @ 2.0 lb/ft 3.0" x 3.0" Sq. Tubing @ 2.0 lb/ft 4.0" O.D. Pipe @ 3.0 lb/ft 6.625" O.D. Pipe @ 7.0 lb/ft
Rails and Braces	1.660" O.D. Pipe @ 2.27 lb/ft	1.660" O.D. Pipe @ 0.786 lb/ft
Gate Frames Leaf Width Less than 8 ft Over 8 ft	1.660" O.D. Pipe @ 2.27 lb/ft 1.5" x 1.5" Sq. Tubing @ 1.90 lb/ft 1.90" O.D. Pipe @ 2.72 lb/ft 2.0" x 2.0" Sq. Tubing @ 2.10 lb/ft	1.900" O.D. Pipe @ 0.94 lb/ft 2.0" x 2.0" Sq. Tubing @ 0.94 lb/ft 1.90" O.D. Pipe @ 0.94 lb/ft 2.0" x 2.0" Sq. Tubing @ 0.94 lb/ft

Page 559

M-210.02 (C) Barbed Wire.

Rescind this article in its entirety and replace it with the following:

(C) Barbed Wire. Barbed wire shall be zinc-coated, steel barbed wire meeting the requirements of ASTM A 121. Breaking strength of strand wire shall be not less than 950 pounds. Barbs shall be uniformly spaced from 4 to 5 inches apart. Minimum weight of zinc coating shall be Class 1, except minimum weight of coating for 15½-gage strand wire shall be Class 3.

M-210.02 (H) Metal Posts and Braces.

Add the following as the first sentence in this article: "Metal fence posts shall meet the requirements of ASTM A 702."

In TABLE B on page 560, change the dimensions for corner, end, gate, and pull posts to be 2½" x 2½" x ¼" or heavier and change the dimensions for braces to 2" x 2" x ¼" or heavier.

Rescind the last sentence of the first paragraph following TABLE B on Page 560.

Page 560

M-210.02 (I) Wood Fence Posts and Brace Rails.

On Page 561 place a vertical line in the right-hand margin to span Lines 5, 6, 7, & 8.

Change the first sentence in the fourth paragraph of this article to read as follows:

Wood posts for farm fence shall be treated with a minimum 5 percent by weight pentachlorophenol solution or Chromated Copper Arsenate (CCA), type B or C, or Ammoniacal Copper Arsenate (ACA) conforming to AWWA standards.

Change the third sentence in the fourth paragraph of this article to read as follows:

Treatment shall extend to a minimum length of 36 inches for line posts and 48 inches for other posts.

Page 565

M-220.01 (A)(1) Steel Beam.

Rescind the first paragraph of this article and replace it with the following:

(1) Steel Beam. Steel beam guard rail units shall conform to the requirements of AASHTO M180, Class A, Type 1.

Rounded end sections, buffer sections, and terminal connectors shall conform to the requirements of AASHTO M180, Class B, Type 1.

Page 566

M-220.01 (B)(1) Wood Posts.

Change the title of this article to be "Wood Posts and Blocks".

Change the first sentence in this article to read: "Wood posts and blocks shall be...".

Change the third sentence in the third paragraph of this article to read as follows:

Posts and blocks shall be treated with a minimum 5 percent by weight pentachlorophenol solution or Chromated Copper Arsenate (CCA), type B or C, or Ammoniacal Copper Arsenate (ACA) conforming to AWPA standards.

Page 567

M-220.01 (C)(1) Wood Treatment.

Rescind the first sentence in this article and replace it with the following:

(1) Wood Treatment. Wood posts and blocks shall be pressure treated, as specified in Section M-270, with a 5 percent by weight pentachlorophenol solution or Chromated Copper Arsenate (CCA), type B or C, or Ammoniacal Copper Arsenate (ACA) conforming to AWPA standards.

Page 569

M-270.04 (A) Treated timber shall...

Rescind the second paragraph of this article and replace it with the following:

The preservative shall be one of the following: creosote oil, creosote coal tar solution, 5 percent by weight pentachlorophenol solution, Chromated Copper Arsenate (CCA), type B or C, or Ammoniacal Copper Arsenate (ACA). They shall conform to AWPA standards unless otherwise specified.

Page 570

M-270.04 (B) Incising.

Rescind the first sentence in this article and replace it with the following:

(B) Incising. Lumber of the species listed below with a nominal thickness of 2 inches or greater shall be incised in a suitable, power-driven machine before treating. The following species shall require incising:

Intermountain Douglas Fir	Jack Pine	Sugar Pine
Pacific Coast Douglas Fir	Lodgepole Pine	Western White Pine
Western Hemlock	Northern White Pine	Redwood
Western Larch	Red Pine	

Page 571

M-280.01 (4) Mineral Iron Oxide Pigments

Rescind this article in its entirety.

Page 572

M-280.02 (3) Aluminum Paint

Rescind this article in its entirety and replace it with the following:

(3) Aluminum Paint, Ready Mixed, shall meet the requirements of AASHTO M260 (Type II).

M-280.02 (5) Red Lead...

Rescind the reference to "AASHTO M71" and replace it with "ASTM D 83".

M-280.02 (7) Basic lead silico chromate paint...

Rescind this article in its entirety and replace it with the following:

(7) Basic Lead Silico Chromate Paint shall meet the requirements of AASHTO M229 (Type II).

M-280.02 (8) First coat white...

Rescind this article in its entirety and replace it with the following:

(8) First coat white (prime) for use on wood shall be made of: 100 pounds - White Lead Paste (9% Linseed Oil), 5 gallons - Raw Linseed Oil, 2 gallons - Spirits of Turpentine, and 1 pint - Liquid Paint Driers. The white lead paste may be either Basic Carbonate White Lead or Basic Sulfate White Lead or a mixture of both.

M-280.02 (9) Black paint...

Rescind this article in its entirety and replace it with the following:

(9) Black paint to be used on wood shall be made of: 20 pounds - Lamp-black, 4½ gallons - Raw Linseed Oil, 2 quarts - Spirits of Turpentine, and 1 pint - Liquid Paint Driers.

Page 573

M-280.02 (11) Items 1,2,3,...

In the first line, change the reference article number to be "M-280.02" instead of "M-280.01".

Page 574

M-280.02(13)(d) Pigment.

In the first line of the second paragraph change "1.85 lbs." to be "1.5 lb".

Page 576

M-280.02 (13)(x)(b)1. Imperfections-

Change the first word in the second line of this article to "25" instead of "twenty".

Page 577

M-280.02 (14) White, Yellow and Black Enamel for Metal.

In the last paragraph of this article change the first sentence to read:

"The white enamel shall be equal in brightness to that obtainable with Rutile (Type IV) Titanium Dioxide Pigment."

Page 581

M-290.02 STRUCTURAL STEEL.

Rescind this article in its entirety and replace with the following:

M-290.02 STRUCTURAL STEEL. Unless otherwise specified, structural steel for riveted, bolted, or welded construction shall conform to the requirements for structural steel, ASTM A 36. Steel for eyebars shall be a weldable steel of the grade and designation shown on the plans.

M-290-03 WROUGHT IRON.

Rescind this article, including the title, and replace with the following:

M-290.03 STRUCTURAL STEEL TUBING. Structural steel tubing for bridges shall conform to ASTM A 500, Grade B, cold-formed welded and seamless carbon steel structural tubing in rounds and shapes.

M-290.04 PINS AND ROLLERS.

Rescind this article in its entirety and replace with the following:

M-290.04 PINS AND ROLLERS. Unless otherwise shown on the plans, pins and rollers shall be either annealed carbon steel forgings conforming to the requirements of AASHTO M102, Class C, or cold-finished carbon steel shafting conforming to the requirements of AASHTO M169, Grades 1018 to 1030 inclusive. Pins and recessed pin nuts shall be constructed in accordance with details shown in the AISC Manual of Steel Construction, Seventh Edition.

Page 582

M-290.06 HIGH TENSILE STRENGTH BOLTS.

Add the following as the second paragraph of this article:

When galvanized high tensile strength bolts are specified, the contractor shall specify in his purchase orders that copies of the manufacturer's inspection test reports for the materials be furnished. Copies of the test reports shall be made available to the engineer upon request.

M-290-07 BOLTS AND NUTS.

Rescind this article in its entirety and replace with the following:

M-290.07 BOLTS AND NUTS. Bolts, threaded rod, and nuts shall conform to the requirements of ASTM A 307, Grade A. Heads and nuts for steel machine bolts and tap bolts shall be hexagonal.

Insert new article as follows:

M-290.19 ELASTOMERIC BEARING DEVICES. Elastomeric bearings shall be either plain bearings, consisting of elastomer only, or laminated bearings, consisting of layers of elastomer restrained at their interfaces by bonded laminates or as shown on the plans.

(A) The elastomer portion of the elastomeric compound shall be 100 percent virgin chloroprene meeting the requirements in the table below.

(B) Laminates shall be rolled mild steel sheets conforming to AASHTO M183 (ASTM A 36).

(C) Compressive strain of each layer of each elastomeric bearing shall not exceed 7 percent at 800 psi average unit pressure. Shear resistance of the bearing shall not exceed 50 psi at 25 percent strain of the total effective rubber thickness after an extended 4-day ambient temperature of -20° F.

(D) Manufacturing Requirements and Tolerances. Plain bearings shall be molded individually, cut from previously molded strips or slabs, or extruded and cut to length. Cut edges shall be at least as smooth as ANSI 250 finish. All components of laminated bearings shall be molded together into an integral unit, and all edges of the nonelastic laminations shall be covered by not less than 1/8 inch of elastomer.

Flash tolerance, finish, and appearance shall meet the requirements of the latest edition of the Rubber Handbook as published by the Rubber Manufacturers Association, Inc., RMA F3 and T.063 for molded bearings, and RMA F2 for extruded bearings.

For both plain and laminated bearings, the permissible variation from the dimensions and configuration required by the plans and these specifications shall be as follows:

1.	<u>Over-all Vertical Dimensions</u>	
	Average Total Thickness 1½ inches or less	-0,+1/8 in
	Average Total Thickness over 1½ inches	-0,+1/4 in
2.	<u>Over-all Horizontal Dimensions</u>	
	36 inches and less	-0,+1/4 in
	Over 36 inches	-0,+1/2 in
3.	<u>Thickness of Individual Layers of Elastomer</u> (Laminated Bearings Only)	+1/8 in
4.	<u>Variation from a Plane Parallel to the Theoretical Surface</u> (As determined by measurements at the edges of the bearings)	
	Top	1/8 in
	Sides	1/4 in
	Individual Noneleastic Laminates	1/8 in
5.	<u>Edge Cover of Embedded Laminates</u>	-0,+1/8 in

(E) The contractor shall furnish the engineer with a written certification by the bearing manufacturer that the bearings furnished conform to all of the requirements shown on the plans and specified herein.

(F) All bearings shall be packaged and protected in such a manner that they will not be damaged while being handled, transported, or stored. Bearings damaged by handling, transporting, or storing shall be replaced by the contractor at no cost to the Department.

ASTM STANDARD	PROPERTY	REQUIREMENT
<u>Physical Properties</u>		
D 2240	Hardness	50 ± 5
D 412	Tensile Strength, min. psi	2500
D 412	Ultimate Elongation, min. %	400
<u>Heat Resistance</u>		
D 573	Change in Durometer Hardness,	
70 hr	max. points	+15
@ 212°F	Change in Tensile Strength, max. %	-15
	Change in Ultimate Elongation, max. %	-40
<u>Compressive Set</u>		
D 395, Method B	22 hours @ 212° F, max. %	35
<u>Ozone</u>		
D 1149	100 pphm ozone in air by volume, 20% strain, 100° F ± 2° F, 100 hours, mounting procedure ASTM D 518, Procedure A	No Cracks
<u>Adhesion</u>		
D 429, Method B	Bond made during vulcanization, lb per inch	40
<u>Low Temperature Test</u>		
D 746, Procedure B	Brittleness at -40° F	No Failure

Page 633

M-310.11 (A)(3)(a) Treated poles shall...

Rescind this article in its entirety and replace it with the following:

(a) Treated poles shall be full-length pressure treated with a 5 percent by weight pentachlorophenol solution or Chromated Copper Arsenate (CCA), type B or C, or Ammoniacal Copper Arsenate (ACA) conforming to AWWA standards and the requirements of Section M-270.

M-320.01 (E) Treated Timber Posts.

Rescind the first sentence in this article and replace it with the following:

(E) Treated Timber Posts. All treated timber posts shall be construction grade, S4S, and full-length pressure treated with a 5 percent by weight pentachlorophenol solution or Chromated Copper Arsenate (CCA), type B or C, or Ammoniacal Copper Arsenate (ACA) conforming to AWPA standards and the requirements of Section M-270.

M-320.01 (F) Treated Timber Poles.

In the second line in this article change "A.S.A." to be "ANSI".

Change the seventh word in the fifth line of this article to be "or" instead of "of".

M-320.01 (G) Barn Poles.

Rescind the second paragraph of this article and replace it with the following:

All poles shall comply with ANSI specifications for straightness. Barn poles shall be full-length pressure treated with a 5 percent by weight pentachlorophenol solution or Chromated Copper Arsenate (CCA), type B or C, or Ammoniacal Copper Arsenate (ACA) conforming to AWPA standards and the requirements of Section M-270.

M-320.01 (K) (1) General.

Add the following as the second paragraph of this article:

The colors specified shall be matched visually and be within the color tolerance limits shown on the appropriate Highway Color Tolerance Charts issued by the Federal Highway Administration, utilizing the instructions thereon.

M-320.01 (K)(2) Photometric.

Rescind this article in its entirety and replace it with the following:

(2) Reflective Intensity. The reflective sheeting shall have minimum reflective intensity values at 0.2°, 0.5°, and 1.5° divergence, as shown in the following table, expressed as candlepower per footcandle per square foot. Measurements will be conducted in accordance with standard photometric testing procedures for reflex reflectors in Federal Specification L-S-300 A, "Sheeting and Tape, Reflective: Non-exposed Lens, Adhesive Backing".

Div. Angle	Silver-White 0.2° 0.5° 1.5°	Yellow 0.2° 0.5° 1.5°	Red 0.2° 0.5° 1.5°
Inc. Angle			
-4°	250.0 95.0 4.0	170.0 62.0 3.0	35.0 13.0 0.7
40°	120.0 54.0 2.0	80.0 35.0 1.5	16.0 7.4 0.3
Div. Angle	Blue 0.2° 0.5° 1.5°	Green 0.2° 0.5° 1.5°	Orange 0.2° 0.5° 1.5°
Inc. Angle			
-4°	20.0 7.5 0.3	30.0 12.0 0.5	70.0 25.0 1.0
40°	9.0 4.2 0.1	14.0 6.8 0.2	33.0 14.0 0.7

The brightness of the reflective sheeting when totally wet shall not be less than 90 percent of the dry values shown above. Wet-performance measurement will be made on unweathered sheeting in accordance with standard rainfall tests specified in Federal Specification L-S-300 A.

Page 650

M-320.01 (K)(5)(a) The contractor shall...

Rescind the table in this article and replace it with the following:

Sheeting Type and Color	Average Minimum Candlepower per Footcandle per Square Foot at 0.2° Divergence and -0.4° Incidence	Satisfactory Performance Life
Silver-White	200	10 years
Yellow	136	10 years
Red	28	10 years
Green	24	10 years
Orange	56	10 years
Blue	16	3 years

Candlepower measurements shall be made following sign cleaning. Cleaning shall be done in accordance with procedures recommended by the sheeting manufacturer.

Page 657

M-320.03 REFLECTORIZED PLASTIC PAVEMENT MARKERS AND LEGENDS.

Rescind this article in its entirety and replace it with the following:

M-320.03 PLASTIC PAVEMENT MARKING MATERIAL.

(A) Composition Requirements. Plastic pavement marking material shall consist of plastics and plasticizers, pigments, and graded glass spheres combined in such a manner and in such proportions as to provide a finished product that meets the requirements specified herein.

Pigments shall include titanium dioxide for white marking material and medium chrome yellow for yellow marking material. Titanium dioxide should be at least 20 percent of the total pigment in white marking material. Yellow marking material should have a minimum of 18 percent pigment as medium chrome yellow.

The graded glass spheres shall be clean, transparent, and shall meet the requirements of Article M-280.02 (13) (x) (b) 1. thru 4.

(B) Physical Requirements:

(1) Tensile Strength. The plastic material shall have a minimum tensile strength of 40 psi of cross section when tested according to ASTM D 638. The break resistance shall be based on an average of at least three samples tested at a temperature of 70° - 80° F using a jaw speed of 0.25 inch per minute.

(2) Plastic Pull Test. A 1- by 6-inch sample of the plastic material shall support a dead weight of 0.66 pounds per 0.01 inch of material thickness for not less than 5 minutes at a temperature of 70° - 80° F.

(3) Bend Test. The plastic material shall be of sufficient flexibility so that at 80° F a 3- by 6-inch sample of the material can be bent over a 1-inch diameter mandrel until the end faces are parallel and 1 inch apart without showing any fracture lines in the uppermost surface under unassisted visual inspection.

(4) Skid Resistance. The surface friction properties of the plastic shall be not less than 35 BPN when tested according to ASTM E 303.

(5) Reseal Test. The plastic shall reseal to itself without adhesives when tested in the following manner: Overlap two 1- by 3-inch pieces face-to-face so that they form a single 1- by 5-inch piece with a 1-square inch overlap in the center. Place the 1- by 5-inch piece on a hard surface with a 1000-gram weight resting uniformly on the entire overlap area and maintain at 140° - 190° F for 2 hours. The actual temperature to be maintained depends on the material being tested but shall be within the specified range. After cooling to room temperature, the pieces shall not be separable without tearing.

(6) Reflectivity. Reflective pavement marking material shall have reflective values not less than those listed in the table below. Reflective values shall be measured in accordance with Federal Specification L-S-300B. The reflective values shall be measured on a 2- by 2½-foot panel at 86° incidence and shall be expressed as average candlepower per footcandle per 5 square feet of material.

Divergence Angle	White	Yellow
0.2°	0.20	0.15
0.5°	0.15	0.10

